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A review of the assassin-fly genus *Anypodetus* Hermann, 1907 with the description of a new species (Insecta, Diptera, Asilidae)

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Abstract

The genus *Anypodetus* Hermann, 1907 (Diptera, Asilidae, Laphriinae) is reviewed. Currently, eight species are recognized from Botswana, Mozambique, Namibia, South Africa, Zimbabwe, and southern-most Zambia, i.e., *Anypodetus arachnoides* Oldroyd, 1974 widespread, *Anypodetus fasciatus* Hermann, 1907 widespread, *Anypodetus fascipennis* Engel, 1924 widespread, *Anypodetus leucothrix* Londt, 2000 restricted to southern Namibia and south-western South Africa, *Anypodetus macroceros* Londt, 2000 restricted to west-central Namibia, *Anypodetus nigrifacies* Ricardo, 1925 restricted to eastern-most South Africa and southern Mozambique, *Anypodetus phalaros* Londt, 2000 Namibia and South Africa, and *Anypodetus unicolor* Oldroyd, 1974 Namibia, eastern South Africa, adjacent Mozambique, and southern Zimbabwe. One new species, *Anypodetus londti* **sp. nov.** from Mozambique and Zimbabwe, is described for a total of nine species in the genus. Study of the secondary type specimens of *A. unicolor* from Namibia revealed that these specimens do not represent this species, reducing the number of species recorded from Namibia to six. *Anypodetus leucothrix* is recorded with several additional collecting events in central and northern Namibia extending its range significantly. Distribution, biology, occurrence in biodiversity hotspots *sensu* Conservation International, and seasonal imago flight activity are discussed. Diagnoses, photographs, specimen occurrence data, and an identification key to species are provided with the new species described in detail. The sexual dimorphism in the development of the mystax and wing vein variation in regard to the alignment of M_2 and M_3 are discussed and illustrated.

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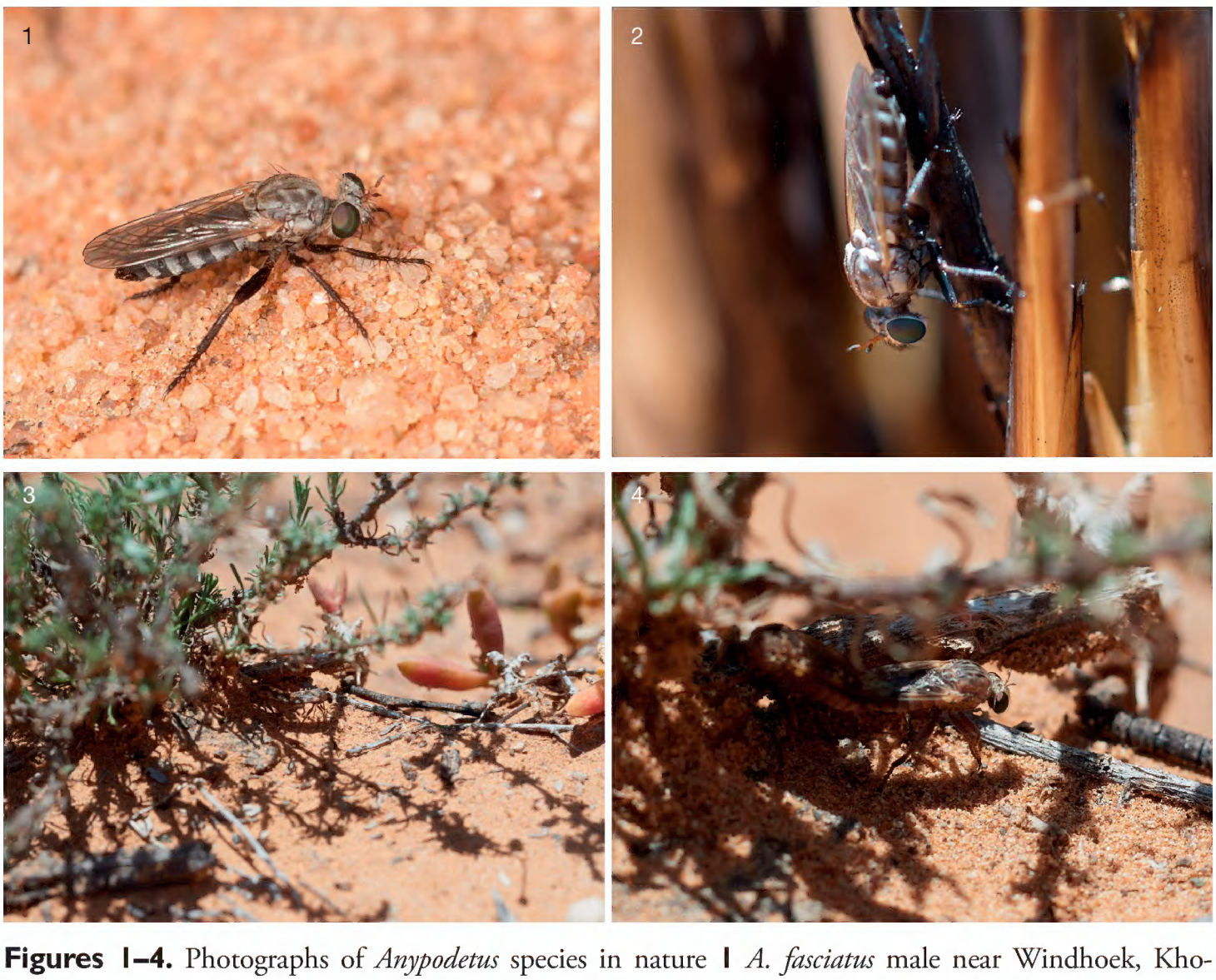
Keywords
Afrotropical, mystax sexual dimorphism, robber fly, wing vein variation

Introduction

Anypodetus Hermann, 1907 is a morphologically unique genus of assassin flies. It is one of two Afrotropical Laphriinae genera without pulvilli (Londt and Dikow 2017a, Figs 1, 12, 16) – the other one being *Prytanomyia* Özdikmen, 2006 (Londt and Dikow 2017b). Furthermore, the majority of species exhibit a unique arrangement of wing veins in that the proximal portion of vein M_2 and the distal portion of vein M_3 form a line from anterior to posterior with the crossvein m-m being absent or highly reduced (Figs 13, 19, 23, 31, 36, 47, 49). This venation is known from genera of Atomosiini (Laphriinae, Hermann 1912; Hull 1962; Dikow 2009) including the Afrotropical genera *Dichaetothyrea* Meijere, 1914, *Goneccalypsis* Hermann, 1912, and *Loewinella* Hermann, 1912 reviewed by Londt (1982) as well as *Orthogonis* Hermann, 1914 (Londt and Dikow 2017a). *Anypodetus fascipennis* Engel, 1924 is the exception as it is the only species of this genus with a distinct crossvein m-m (Figs 25, 29) but it is important to note that there appears to be intraspecific variation in the arrangement of these veins (see Discussion). Another interesting morphological feature is that several species exhibit distinct mystax morphology in females and males. In Asilidae, the sexes are usually only distinguishable morphologically by examining the tip of abdomen and features such as the mystax cannot be used to determine the sex of a specimen with a broken abdomen.

Anypodetus was reviewed by Londt (2000) who recognized eight species, which are restricted to southern Africa with a single specimen record from southern Zambia to date. These species have been collected throughout southern Africa (Figs 1–11). The highest species diversity is found in Namibia with seven recorded species (Londt 2000, Figs 51, 52, but see below).

This study was instigated by the discovery and collection of unique flies belonging to *Anypodetus* in the Namib Desert in west-central Namibia by the senior author that did not key out immediately to one of the known eight species in the identification key published by Londt (2000). Further study of these specimens revealed that they belong to a described species, *A. leucothrix* Londt, 2000 (Figs 30–35), but that they exhibit variation in the wing venation not originally described for this species. In addition, an undescribed species was discovered among natural history museum collections and is described below. This study was impacted by the Sars-CoV-2 pandemic in that not all specimens were available as a loan from museums. Even in the absence of seeing every single specimen, the identifications by Londt (2000) are regarded as accurate and have been included in the material examined adding their unique specimen identifier (NMSA-DIP-XXXXX) now established at the NMSA for future reference. Nonetheless, this review includes many specimens not studied by Jason Londt in 2000 from the NMBZ, SMNS, and USNM that greatly expand our understanding of the distribution of *Anypodetus* species (see also Fig. 11).



Figures 1–4. Photographs of *Anypodetus* species in nature **1** *A. fasciatus* male near Windhoek, Khomas, Namibia, 12 Nov 2012 **2** *A. fasciatus* male at Namib-Naukluft NP, Erongo, Namibia (23°34'05"S, 015°48'16"E) (see habitat photo in Fig. 7, iNaturalist observation https://www.inaturalist.org/observations/63337147), 8 Feb 2012 **3, 4** *A. fascipennis* female and male in copula at Aberdeen NR, Eastern Cape, South Africa (32°28'11"S, 024°01'23"E) (see habitat photo in Fig. 6, iNaturalist observation https://www.inaturalist.org/observations/152200595), 5 Dec 2015. Photographs by S. Marshall (**1**) and T. Dikow (**2–4**).

The taxonomic history of *Anypodetus* can be summarized as follows:

Hermann (1907) described the genus *Anypodetus* with its type species *Anypodetus fasciatus* Hermann, 1907 from Lichtenburg in the North-West province of South Africa.

Engel (1924) described *Anypodetus fascipennis* Engel, 1924 and *Anypodetus semirufus* Engel, 1924 both from Willowmore, Eastern Cape province of South Africa.

Ricardo (1925) described *Anypodetus maculipennis* Ricardo, 1925 from Sawmills and Bulawayo, Zimbabwe and *Anypodetus nigrifacies* Ricardo, 1925 from Lourenço-Marqués (= Maputo), Mozambique.

Engel (1929) highlighted the fact that J. Brauns, the collector of the types series of both *A. fascipennis* and *A. semirufus* at Willowmore, suggested that *A. semirufus* is a variety of *A. fascipennis* with which Engel agrees, therefore synonymyzing the two species. He furthermore synonymized *A. maculipennis* with *A. semirufus* (an unusual action since *semirufus* was just made a junior synonym) and *A. nigrifacies* with *A. fascipennis* (an action no other authors have accepted).

Figures 5–10. Habitat photographs where *Anypodetus* specimens were observed and collected **5** acacia savanna and white sand dune at Witsand NR, South Africa (28°34'42"S, 022°27'45"E), *A. fasciatus* collected, 31 Jan 2004 **6** Acacia bushveld and dry pan at Aberdeen NR, South Africa (32°28'11"S, 024°01'23"E), *A. fascipennis* collected (see Figs 3, 4), 5 Dec 2015 **7** sand dune and adjacent sandy area at Namib-Naukluft NP, Namibia (23°34'05"S, 015°48'16"E), *A. fasciatus* collected (see Fig. 2), 8 Feb 2012 **8** sparsely vegetated sand dune at Namib-Naukluft NP, Namibia (23°34'22"S, 015°48'37"E), *A. leucothrix* collected, 26 Sep 2017 **9** Acacia savanna at Fort Francois, Namibia (22°40'08"S, 016°37'15"E), *A. fascipennis* collected, 31 Jan 2012 **10** partly vegetated sand dune at Rooisand Desert Ranch, Namibia (23°16'27"S, 016°06'51"E), *A. fasciatus* collected, 19 Nov 2018. Photographs by T. Dikow.

Engel and Cuthbertson (1934) reviewed the biology of several Asilidae species from Zimbabwe and established the synonymy of *A. maculipennis* with *A. fascipennis*. They furthermore recorded *A. fasciatus* from northern Zimbabwe with grasshop-

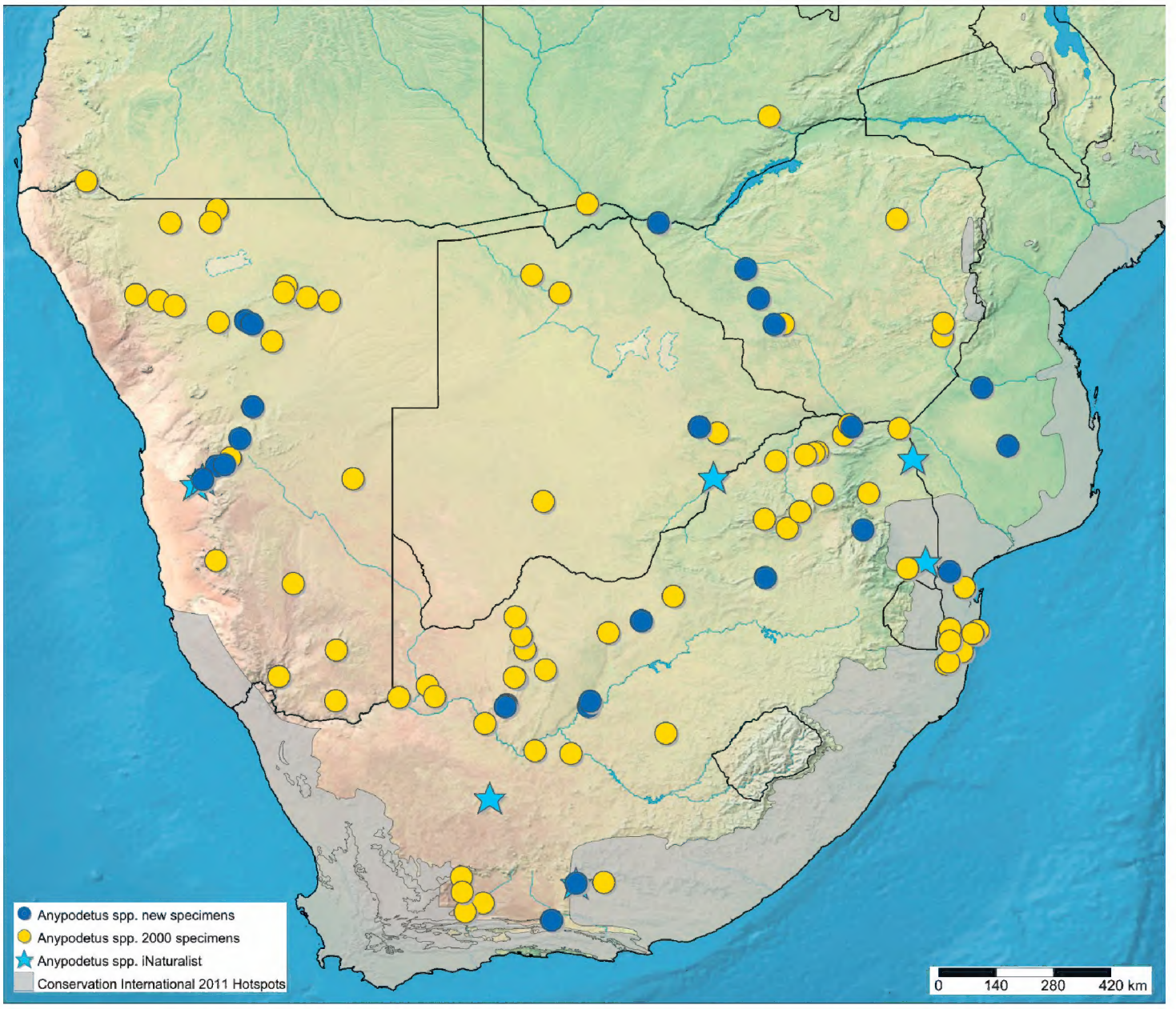


Figure 11. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *Anypodetus* specimens studied by Londt (2000) and now (SimpleMappr https://www.simplemappr.net/map/20262). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20262.kml.

per prey and *A. fascipennis* from southern Zimbabwe in Mopane forests (Fabaceae, *Colophospermum mopane*).

Oldroyd (1974) reviewed the genus and described *Anypodetus arachnoides* Oldroyd, 1974 from Sawmills, Zimbabwe, *Anypodetus rigidis* Oldroyd, 1974 also from Sawmills, and *Anypodetus unicolor* Oldroyd, 1974 from Ndumu Game Reserve in eastern-most South Africa. He synonymized *A. semirufus* and *A. maculipennis* with *A. fascipennis*, being unaware of Engel's (1929) and Engel and Cuthbertson's (1934) earlier actions, recognizing six valid species.

Oldroyd (1980) catalogued the following species: *Anypodetus fasciatus*, *A. fascipennis* with *A. maculipennis* as a junior synonym, *A. nigrifacies*, *A. arachnoides*, *A. rigidis*, and *A. semirufus*, and *A. unicolor* for a total of seven valid species.

Londt (1998) reported on the species of Asilidae recorded from the southern-most Nama Karoo in and around the town of Willowmore by J. Brauns in the NMSA collection and listed three *Anypodetus* species identified by F. Hermann:

A. fascipennis, *A. semirufus*, and an undescribed species '*A. varipennis*' (an unpublished name, see under *A. fascipennis*).

Londt (2000) reviewed the genus and described *Anypodetus leucothrix* from the Gamka River in the Western Cape province of South Africa, *A. macroceros* Londt, 2000 from west-central Namibia, and *A. phalaros* Londt, 2000 from near Louis Trichardt, Limpopo province, South Africa. He synonymized *Anypodetus rigidis* with *A. fasciatus* and supported the synonymy of *A. maculipennis* and *A. semirufus* with *A. fascipennis* recognizing a total of eight valid species. The male terminalia of all species were illustrated to aid in the identification. He commented on Oldroyd's error who listed *A. semirufus* as a valid species in 1980 while he had synonymized it in 1974.

Londt and Dikow (2017a) provided a review of the Afrotropical Asilidae with an updated key to the genera including *Anypodetus* and summarized what was known about this genus.

At the commencement of this study, *Anypodetus* was, therefore, known from eight species: *A. arachnoides*, *A. fasciatus*, *A. fascipennis*, *A. leucothrix*, *A. macroceros*, *A. nigrifacies*, *A. phalaros*, and *A. unicolor*.

Materials and methods

Morphological features were examined using Zeiss SteREO Discovery.V8 and V12 stereo microscopes. Wing length is measured from the tegula to the distal tip of the wing.

Terminology

Terminology follows Dikow (2009), Cumming and Wood (2017), and Londt and Dikow (2017a) (general morphology and abbreviations for setae), Stuckenberg (1999) (antennae), and Wootton and Ennos (1989) (wing venation). Abdominal tergites are abbreviated in the descriptions with 'T', and sternites are abbreviated with 'S'. The terms prothoracic, mesothoracic, and metathoracic are abbreviated 'pro', 'mes', and 'met', respectively. The term pubescence (adjective pubescent) refers to the short, fine microtrichia densely covering certain body parts. Other generalized terms follow the Torre-Bueno Glossary of Entomology (Nichols 1989).

Species description

The species description is based on composites of all specimens and not exclusively on the holotype and is compiled from a character matrix of 230 features assembled with Lucid Builder (version 4.0.10) and eventually exported as natural-language descriptions. The species description includes therefore features that might not vary within *Anypodetus* but represents a comprehensive morphological description to al-

low future species discoveries and comparisons to other Asilidae genera. The species description has been deposited in the Zenodo data depository and can be accessed in XML-format following the SDD (Structure of Descriptive Data) standard. All taxon names have been registered in ZooBank (Pyle and Michel 2008). If available, permanent URLs or Digital Object Identifiers (DOIs) to the original species descriptions on the Biodiversity Heritage Library (BHL, www.biodiversitylibrary.org) or other online sources are provided. The species record for each species at the Global Biodiversity Information Facility (GBIF, www.gbif.org) provides a summary of occurrence data, images, or taxonomic treatments from natural history collections. The species descriptions from Londt (2000) have been marked up in TaxonX XML language (Catapano 2010) and uploaded to the Plazi TreatmentBank from where they are accessible in human- and machine-readable formats and a permanent URL is provided under each respective species.

Specimen occurrence data

The following data on species occurrences are given (where available): country, state/province, county, locality, geographic co-ordinates, elevation (in meters), date of collection, time of day at collection (if available), habitat information, sampling protocol (if other than hand netting), collector, catalog number (a unique specimen identifier and any other identifying number), depository (institution code), number of specimens, sex, life stage, and any other previous identifications. Each specimen is listed with a unique specimen identifier (either an institutional catalog number or an AAM-XXXXXX number used by the senior author) that will allow the re-investigation as well as provide a unique Life Science Identifier (LSID). The occurrence of all species is illustrated in distribution maps plotted with SimpleMappr (Shorthouse 2010) with all of those localities for which co-ordinates are available or could be gathered from online gazetteers or Google Earth. Type localities are plotted with a square symbol, other specimens are plotted with a circular symbol, and iNaturalist observations are plotted with a star symbol. The distribution maps include Biodiversity Hotspots *sensu* Conservation International (Mittermeier et al. 1998; Myers et al. 2000; Mittermeier et al. 2005).

Photographs and illustrations

Whole habitus photographs of pinned USNM specimens were taken with a GIGA-macro Magnify^2 system, a Canon EOS D5 Mark IV full-frame DSLR, a Canon MP-E 65 mm f2.8 macro-lens, and illuminated by a Canon MR-14EX II Macro Ring Lite. Individual RAW-format images were stacked using HeliconFocus Pro (version 8.+) and exported in Adobe DNG-format. Photographs of Smithsonian USNM specimens are in the public domain with a Creative Commons license CC0 and can be downloaded in full resolution from the USNM data portal (http://collections.nmnh.si.edu/search/ento/) or the Smithsonian Open Access Portal (https://www.si.edu/openaccess).

Table 1. Summary of mystax setation extent, colouration, and sexual dimorphism in species of *Anypodetus*.

Species	♀ mystax	♂ mystax
A. arachnoides	long black circular macrosetae in ventral ⅓ of face, Fig. 14	long black circular macrosetae in ventral ½ of face; short white dorso-ventrally flattened setae in dorsal ½ of face, Fig. 15
A. fasciatus	sparsely arranged long yellowish circular macrosetae (few black) on entire face; short yellowish setae interspersed, Fig. 20	sparsely arranged long black circular macrosetae on entire face; short white setae interspersed, Fig. 21
A. fascipennis	long yellowish (medially) and black (laterally) circular macrosetae in ventral ½ of face; short yellowish circular setae in dorsal ½ of face, Fig. 26	long yellowish circular macrosetae in ventral ½ of face; long yellowish circular setae in dorsal ½ of face, Fig. 27
A. leucothrix	densely arranged long white circular setae in ventral ¼ of face; few long yellowish circular macrosetae in ventral ½, of face; sparsely arranged shorter white circular setae in dorsal ⅔ of face, Fig. 32	densely arranged long white circular setae in ventral ⅓ of face; sparely arranged long black circular setae in dorsal ⅔ of face, Fig. 33
A. londti sp. nov.	unknown	densely arranged long white dorso-ventrally flattened setae on entire face; long black circular macrosetae in ventral ¼ of face, Fig. 38
A. macroceros	unknown	long black circular macrosetae on entire face; short white circular setae interspersed, Fig. 41
A. nigrifacies	long black circular macrosetae in ventral ¼ of face; short black circular setae in dorsal ¾ of face, Fig. 44	
A. phalaros	long black circular macrosetae medially on entire face; shorter white dorso-ventrally flattened setae laterally on entire face, Fig. 48	
A. unicolor	long yellowish or black circular macrosetae on entire face; shorter white setae laterally on entire face, Fig. 49	

Keys

The online, interactive dichotomous key has been built with Lucid Builder (version 4.0.10) and can be accessed on Lucidcentral and the senior author's research web-site. It has also been archived in the Structure of Descriptive Data (SDD) standard at Zenodo.

Institutions providing specimens

Institutions providing specimens are listed below, together with the abbreviations used in the text when citing depositories (institutionCode), a link to the record in the Global Registry of Scientific Collections (GRSciColl), and the people who kindly assisted: **MFN** – Museum für Naturkunde, Berlin, Germany (J. Pohl, S. Marotzke); **NHMUK** – The Natural History Museum, London, UK (E. McAlister); **NMBZ** – Natural History Museum of Zimbabwe, Bulawayo, Bulawayo, Zimbabwe (D. Madamba); **NMSA** – KwaZulu-Natal Museum, Pietermaritzburg, KwaZulu-Natal, South Africa (K. Williams); **SAMC** – Iziko South African Museum, Cape Town, Western Cape, South Africa; **SANC** – South African National Collection of Insects, Pretoria, Gauteng, South Africa; **SMNS** – Staatliches Museum für Naturkunde, Stuttgart, Germany (D. Whitmore); **SNSB-ZSM** – Zoologische Staatssammlung, München, Bayern, Germany (D. Doczkal); **USNM** – United States National Museum, Smithsonian Institution, Washington, DC, USA.

Data resources

Lucid Builder: illustrated, dichotomous, pathway identification key – https://keys.lucidcentral.org/keys/v4/anypodetus_dichotomous (archived in SDD format at Zenodo – https://doi.org/10.5281/zenodo.7829624).

Plazi TreatmentBank taxon treatments:

Londt 2000 – http://tb.plazi.org/GgServer/summary/FF8AE557F04F9D4CFFC8FFC4DA5E4277.

SimpleMappr: distribution maps – https://www.simplemappr.net/map/20262?width=1000&height=750&legend=true (as in Fig. 3; Google Earth KML file http://www.simplemappr.net/map/20262.kml); https://www.simplemappr.net/map/20266?width=1000&height=750&legend=true (as in Fig. 51; Google Earth KML file http://www.simplemappr.net/map/20266.kml); https://www.simplemappr.net/map/20267?width=1000&height=750&legend=true (as in Fig. 52; Google Earth KML file http://www.simplemappr.net/map/20267.kml).

Zenodo: natural-language species description from Lucid Builder 4.0 in SDD format – https://doi.org/10.5281/zenodo.7829642.

ZooBank new nomenclatorial acts: https://zoobank.org/23832803-9A79-416E-BF0D-7462CEC2A862.

Taxonomy

Anypodetus Hermann, 1907

Anypodetus Hermann, 1907: 69. Type-species: *Anypodetus fasciatus* Hermann, 1907, by original designation.

Taxon depository. ZooBank: http://zoobank.org/63102CAB-9379-42CA-98CF-4F00619DFB70;

Original description online: https://www.biodiversitylibrary.org/page/12637581;

GBIF: https://www.gbif.org/species/1664898;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F04B-9D48-FE18-FF29D9E046D5;

iNaturalist: https://www.inaturalist.org/taxa/641011-Anypodetus.

Diagnosis. The genus can be delineated by the absence of pulvilli, very long macrosetae on the scape that often reach the tip of the antennae, the sexual dimorphism in mystax setae coloration and arrangement in some species, the absence of macrosetae on the supero-posterior anepisternum, the wing cell r_5 open and cell m_3 closed, the small size with a wing length of 4.8–8.5 mm, and the restricted distribution to southern Africa (single record from southern Zambia).

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa with a single locality in southern Zambia

Table 2. Collecting event summary for *Anypodetus* species.

Species	# Specimens	#♀/#♂	# Collecting events	Earliest collection	Most recent collection	Most recent iNaturalist observation
A. arachnoides	67	33/33	23	1913	2005	2022
A. fasciatus	85	44/41	35	1919	2018	2012
A. fascipennis	121	67/54	31	1907	2015	2020
A. leucothrix	33	18/15	10	1925	2019	2022
A. londti sp. nov.	2	0/2	2	1938	1964	–
A. macroceros	1	0/1	1	1974	1974	–
A. nigrifacies	22	12/10	11	1906	1988	–
A. phalaros	3	2/1	3	1972	1975	2015
A. unicolor	44	24/20	15	1913	1990	–
summary total	378	200/177	131	1906	2019	2022

Table 3. Seasonal imago flight activity of *Anypodetus* species through number of specimens collected and unique collecting events in each month (data given as # specimens/# collecting events). Months abbreviated starting with July. * = additional iNaturalist observation.

Species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
A. arachnoides	–	1/1	–	5/2	9/8*	11/6*	3/2	31/7	8/6	–	–	–
A. fasciatus	–	–	–	4/1	12/6	10/5	17/8	28/7*	11/10	–	–	–
A. fascipennis	–	–	–	20/8	24/5*	21/8*	38/6	13/8	3/2	–	–	–
A. leucothrix	–	–	10/3	1/1*	20/5	–	–	2/1	–	–	–	–
A. londti sp. nov.	–	–	–	–	–	1/1	–	1/1	–	–	–	–
A. macroceros	–	–	–	–	–	–	–	1/1	–	–	–	–
A. nigrifacies	–	–	–	2/1	2/2	4/2	1/1	11/3	2/2	–	–	–
A. phalaros	–	–	–	–	–	–	2/1*	–	1/1	–	–	–
A. unicolor	–	–	1/1	1/1	31/7	6/2	1/1	2/2	1/1	–	–	–
total	–	1/1	11/4	33/14	98/33	53/24	62/19	89/30	26/22	–	–	–

(Figs 11, 51, 52). A relatively commonly observed and collected genus known from 378 specimens in museum collections from 131 collecting events between 1906–2019 and nine observations at iNaturalist (Table 2). Three species of *Anypodetus* occur in the Maputaland-Pondoland-Albany biodiversity hotspot, but none are endemic to this hotspot. Adult flies are active from spring to late summer (September–March) with a single record for August (Table 3). With the exception of a few isolated prey records nothing is known of the biology.

Anypodetus arachnoides Oldroyd, 1974

Figs 12–17, 51

Taxon depository. ZooBank: https://zoobank.org/E98A1482-DA4A-40B9-8A1D-CFD12C02885A;

GBIF: https://www.gbif.org/species/1664899

Figures 12–17. *A. arachnoides* **12** ♀ (USNMENT00870120), lateral **13** same, dorsal **14** same, head anterior **15** ♂ (USNMENT00870117), head anterior **16** same, lateral **17** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F045-9D41-FF58-FBE3D93A44FD.

Diagnosis. The species is distinguished from congeners by the entirely orange postpedicel, the short white, tightly packed, dorso-ventrally flattened macrosetae in the male mystax, and the entirely black mystax in females restricted to the lower facial half.

Type locality. Zimbabwe: Matabeleland North: Sawmills (19°35'00"S, 028°02'23"E, -19.58333, 28.03972).

Material examined. Botswana – Central • 1♀ Farmer's Brigade, 5 km SE Serowe; 22°25'00"S, 026°44'00"E; 21 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-024272, NMSA • 1♀ same locality; 22 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-008925,

NMSA • 1♀ same locality; 15 Feb. 1983; Forchhammer, P. leg.; NMSA-DIP-008921, NMSA • 1♂ same locality; 25 Nov. 1983; Forchhammer, P. leg.; NMSA-DIP-008923, NMSA • 1♂ same locality; 30 Mar. 1985; Forchhammer, P. leg.; NMSA-DIP-008933, NMSA • 1♂ same locality; 21 Nov. 1985; Forchhammer, P. leg.; NMSA-DIP-008919, NMSA • 1♂ same locality; Dec. 1985; Forchhammer, P. leg.; NMSA-DIP-008916, NMSA • 1♂ same locality; Mar. 1986; Forchhammer, P. leg.; NMSA-DIP-008920, NMSA • 1♂ Farmer's Brigade, Serowe; 22°25'00"S, 026°44'00"E; Mar. 1986; Forchhammer, P. leg.; Malaise trap; USNMENT01819604, USNM • 1♂ same locality; Dec. 1987; Forchhammer, P. leg.; Malaise trap; USNMENT01819599, USNM.

Botswana – Ngamiland • 1♂ Maxwee; 19°28'00"S, 023°40'00"E; Nov. 1975; Russel-Smith, A. leg.; grassland; NAMS-DIP-082947, NMSA • 1♀ same locality; 19 Dec. 1975; Russel-Smith, A. leg.; flood plain; NMSA-DIP-008944, NMSA • 1♀ same data; NMSA-DIP-082947, NMSA.

Namibia – Zambezi • 1♀ Katima Mulilo; 17°30'00"S, 024°16'00"E; 20–28 Oct. 1970; Strydom, A. leg.; NMSA-DIP-008918, NMSA • 1♂ same data; NMSA-DIP-082945, NMSA • 1♂ same data; NMSA-DIP-082946, NMSA.

Namibia – Kunene • 1♂ Kaross; 19°30'00"S, 014°20'00"E; Feb. 1925; SAM Museum Staff leg.; SAM-DIP-A008768, SAMC • 1♀ same data; SAM-DIP-A008768, SAMC • 1? same data; SAM-DIP-A008768, SAMC.

Namibia – Otjozondjupa • 1♂ Grootfontein; 19°33'48"S, 018°06'26"E; Dec. 1963; von Teichm. leg.; NMSA-DIP-008946, NMSA.

South Africa – Limpopo • 1♀ Burgersfort, 1 km E; 24°40'53"S, 030°20'06"E; 01 Feb. 1974; Gurney, A. leg.; USNMENT01140570, USNM • 1♂ Messina Nature Reserve; 22°22'00"S, 030°02'00"E; 554 m a.s.l.; 11–12 Feb. 1985; Mansell, M. leg.; SANC • 1♀ Messina Nature Reserve, Mopane dry woodland, Sand River; 22°24'54"S, 030°05'12"E; 487 m a.s.l.; 14 Feb. 2005; Londt, Jason, Dikow, Torsten leg.; USNMENT00870119, USNM • 1♀ same data; USNMENT00870120, USNM • 1♂ Nylsvley Nature Reserve, Naboomspruit; 24°39'00"S, 028°42'00"E; 13 Oct. 1976; Ferrar, P. leg.; NMSA-DIP-008947, NMSA • 1♂ same data; NMSA-DIP-082924, NMSA • 1♂ same locality; 28 Nov. 1978; Ferrar, P. leg.; NMSA-DIP-008950, NMSA • 1♀ Priska, 45 km NE; 29°33'00"S, 023°07'00"E; 1050 m a.s.l.; 19 Mar. 1991; Londt, Jason, Whittington, A. leg.; NMSA-DIP-008936, NMSA • 1♀ Soutpan (= Zoutpan), Soutpansberge; 22°58'00"S, 029°20'00"E; 23–24 Feb. 1980; Londt, Jason, Schoeman, L. leg.; NMSA-DIP-082925, NMSA • 1♀ same data; NMSA-DIP-082926, NMSA • 1♀ same data; NMSA-DIP-082927, NMSA • 1♀ same data; NMSA-DIP-082928, NMSA • 1♀ same data; NMSA-DIP-082929, NMSA • 1♀ same data; NMSA-DIP-082930, NMSA • 1♂ same data; NMSA-DIP-082931, NMSA • 1♂ same data; NMSA-DIP-082932, NMSA • 1♂ same data; NMSA-DIP-082933, NMSA • 1♂ same data; NMSA-DIP-082934, NMSA • 1♂ same data; NMSA-DIP-008940, NMSA • 1♀ Vivo, 6 km N; 22°59'29"S, 029°15'27"E; 23–24 Feb. 1980; Londt, Jason, Schoeman, L. leg.; bushveld vegetation and old lands; NMSA-DIP-008939, NMSA • 1♀ same data; NMSA-DIP-082935, NMSA • 1♀ same data; NMSA-DIP-082936, NMSA • 1♀ same data; NMSA-DIP-082937, NMSA • 1♀ same data; NMSA-DIP-082938, NMSA • 1♀ same data; NMSA-DIP-082940, NMSA • 1♀

same data; SANC • 1♂ same data; NMSA-DIP-082941 NMSA • 1♂ same data; NMSA-DIP-082942, NMSA • 1♂ same data; NMSA-DIP-082943, NMSA • 1♂ same data; NMSA-DIP-082944, NMSA • 1♂same data; NMSA-DIP-082939, NMSA • 1♀ Zoutpan, Zoutpansberg Mountains; 23°10'00"S, 028°25'00"E; 15–30 Nov. 1932; van Son, G. leg.; NMSA-DIP-008941, NMSA.

South Africa – Northern Cape • 1♀ Hotazel, Ga-Mogara River bed; 27°19'00"S, 022°54'00"E; 1050 m a.s.l.; 14 Mar. 1991; Londt, Jason, Whittington, A. leg.; NMSA-DIP-008945, NMSA • 1♂ same data; NMSA-DIP-082923, NMSA • 1♂ Olifantshoek, 5 km W; 27°57'00"S, 022°42'00"E; 1350 m a.s.l.; 15 Mar. 1991; Londt, Jason, Whittington, A. leg.; *Acacia Ziziphus* veld; NMSA-DIP-008937, NMSA • 1♀ Olifantshoek, 8 km W; 27°56'00"S, 022°40'00"E; 1550 m a.s.l.; 15 Mar. 1991; Londt, Jason, Whittington, A. leg.; flat grassy plain; NMSA-DIP-008938, NMSA • 1♀ Vaalbos National Park, Riverside Picnic site; 28°27'28"S, 024°19'59"E; 1055 m a.s.l.; 28–29 Jan. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savannah; USNMENT00870117, USNM • 1♀ same data; USNMENT00870118, USNM.

Zambia – Lusaka • 1♂ Chilanga; 15°34'13"S, 028°16'23"E; 16 Aug. 1913; Wood, R. leg.; on path, NHMUK013445830, ***Paratype***, NHMUK.

Zimbabwe – Bulawayo • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; Dec. 1922; Arnold leg.; NMSA-DIP-008931, NMSA • 1♂ same locality; 04 Nov. 1923; Stevenson, R. leg.; SAM-DIP-A008772, SAMC • 1♀ same locality; 11 Dec. 1923; Stevenson, R. leg.; SAM-DIP-A008770, SAMC • 1♀ same locality; 03 Jan. 1924; Stevenson, R. leg.; SAM-DIP-A008771, SAMC.

Zimbabwe – Harare • 1♂ Hillside; 17°50'00"S, 031°05'00"E; 24 Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-008924, NMSA.

Zimbabwe – Masvingo • 1♂ Sabi Valley; 20°25'00"S, 032°05'00"E; 18 Nov. 1971; NMSA-DIP-008935, ***Paratype***, NMSA.

Zimbabwe – Matabeleland North • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 11 Nov. 1920; Rhodesia Museum leg.; NHMUK013445829, **Holotype**, NHMUK • 1♀ same locality; 26 Dec. 1923; Stevenson, R. leg.; SAM-DIP-A008769, SAMC.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa with a single locality in southern Zambia but not recorded from Mozambique to date (Fig. 51). A commonly observed and collected species known from 67 specimens from 23 collecting events between 1913–2005 and three observations at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from spring to late summer (September–March) with a single record for August (Table 3). Londt (2000) reports two prey records: Diptera: Platystomatidae and an alate Formicidae.

Anypodetus fasciatus Hermann, 1907

Figs 1, 2, 18–23, 52

Anypodetus rigidis Oldroyd, 1974 – synonymy *sensu* Londt 2000: 132.
Anypodetus unicolor Oldroyd, 1974 – all paratypes from Namibia misidentified.

Taxon depository for *Anypodetus fasciatus*. ZooBank: https://zoobank.org/53FF2374-1FC7-468A-9DC1-46D9F367606E;

Original description online: https://www.biodiversitylibrary.org/page/12637582;

GBIF: https://www.gbif.org/species/1664906;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F047-9D42-FF58-FC4BD98E4127;

iNaturalist: https://www.inaturalist.org/taxa/650534-Anypodetus-fasciatus.

Taxon depository for *Anypodetus rigidis*. ZooBank: https://zoobank.org/19EF6F46-00B2-402E-B493-5DD836414974;

GBIF: https://www.gbif.org/species/1664905.

Diagnosis. The species is distinguished from congeners by the mystax with long, loosely arranged black (male) or yellow (female) macrosetae and shorter white to yellowish interspersed setae and the unstained wing that is densely covered by microtrichia.

Type locality. South Africa: North-West: Lichtenburg (26°08'50"S, 026°09'37"E, -26.14722, 26.16028).

Material examined. Botswana • 1♀ Kalahari; Schultze, L. leg.; Paralectotype, MFN.

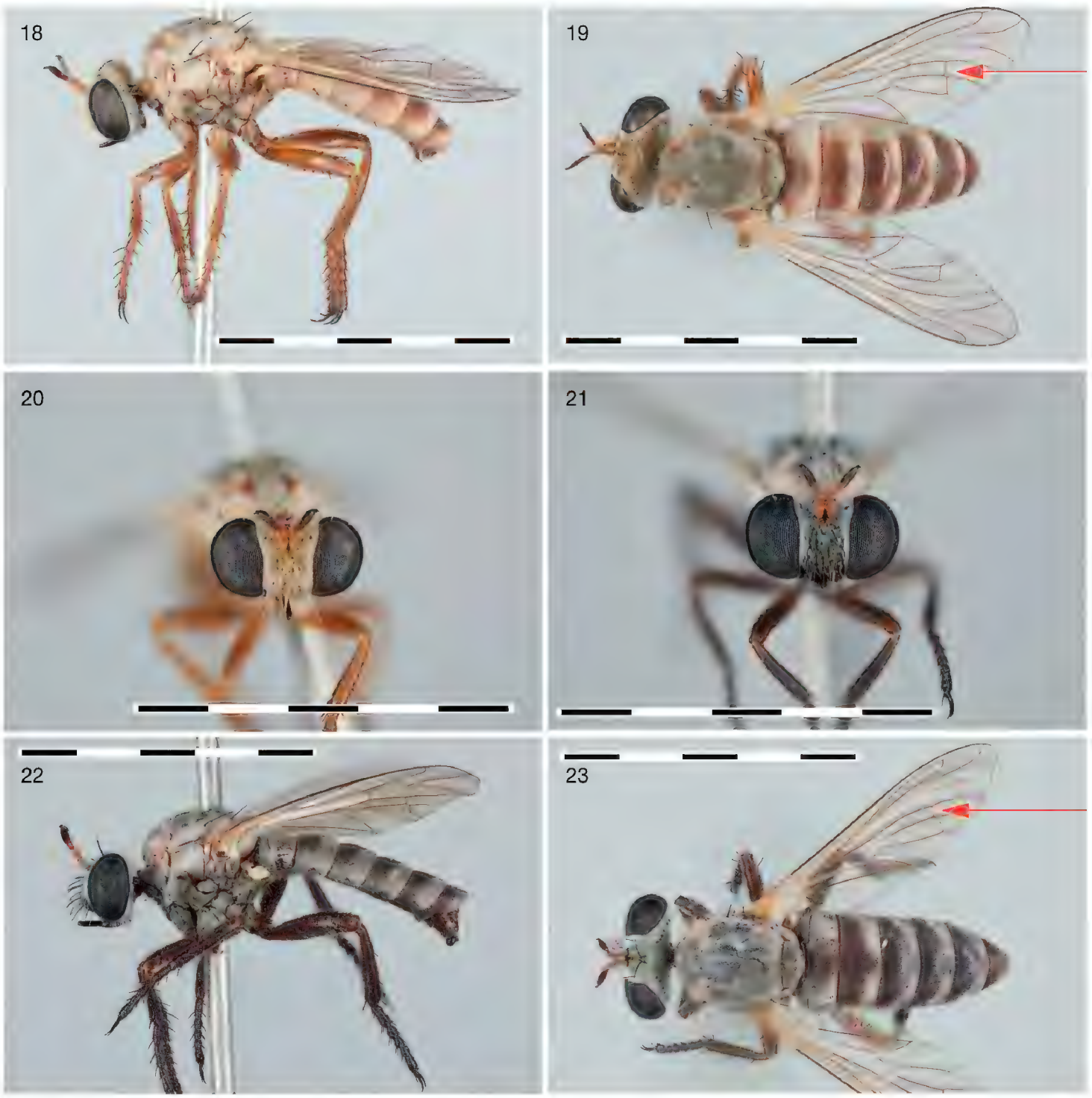
Botswana – Central • 1♀ Serowe; 22°25'00"S, 026°44'00"E; 24 Dec. 1982; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008948, NMSA • 1♂ same data; NMSA-DIP-097008, NMSA • 1♀ same locality; 07 Jan. 1983; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008949, NMSA.

Botswana – Kweneng • 1♂ Matokwe (= Motokwe); 24°03'30"S, 023°18'07"E; 07 Mar. 1963; Oatley, T. leg.; NMSA-DIP-008943, NMSA.

Botswana – Ngamiland • 1♀ Xugana Island; 19°04'00"S, 023°03'00"E; 22–26 Nov. 1979; Lamoral leg.; Malaise trap; NMSA-DIP-008942, NMSA • 1♂ same data; NMSA-DIP-097009, NMSA • 1♂ same data; NMSA-DIP-097010, NMSA.

Namibia – Erongo • 1♂ Namib-Naukluft National Park, off C14; 23°34'25"S, 015°48'39"E; 917 m a.s.l.; 20 Nov. 2018; collected a.m. (9:00–noon); Dikow, Torsten leg.; base of sparsely vegetated sand dune, perching on sand; USNMENT01518048, USNM • 1♂ same data; USNMENT01518049, USNM • 1♂ Namib-Skeleton Coast National Park, off C14; 23°34'05"S, 015°48'16"E; 892 m a.s.l.; 08 Feb. 2012; Dikow, Torsten leg.; sand dune and adjacent sandy area, perching on sand or vertically on low vegetation; USNMENT00832250, USNM • 1♂same data; USNMENT00832251, USNM • 1♂same data; USNMENT00832253, USNM • 1♀ same data; USNMENT00832254, USNM • 1♂ same data; USNMENT00832255, USNM • 1♂same data; USNMENT00832256, USNM • 1♀same data; USNMENT00832257, USNM • 1♀ same data; USNMENT00832258, USNM • 1♂same data; USNMENT00832259, USNM • 1♂same data; USNMENT00832260, USNM • 1♀ same data; USNMENT00832261, USNM • 1♀same data; USNMENT00832262, USNM • 1♀ same data; USNMENT00832264, USNM • 1♀ same data; USNMENT00832265, USNM • 1♀ same data; USNMENT00832267, USNM • 1♀ same data; USNMENT00832268, USNM.

Namibia – Khomas • 1♀ Rooisand Desert Ranch; 23°16'27"S, 016°06'51"E; 1206 m a.s.l.; 19 Nov. 2018; collected p.m. (noon–15:00); Dikow, Torsten leg.; partly vegetated sand dune, perching on sand; USNMENT01518045, USNM • 1♂



Figures 18–23. *A. fasciatus* **18** ♀ (USNMENT01518045), lateral **19** same, dorsal **20** same, head anterior **21** ♂ (USNMENT01518051), head anterior **22** same, lateral **23** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

same data; USNMENT01518051, USNM • 1♂ same data; USNMENT01518052, USNM • 1♀ same data; USNMENT01518053, USNM.

Namibia – Kunene • 1♀ Kamanyab (= Kamanjab); 19°37'43"S, 014°50'33"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008765, SAMC • 1♀ same data; SAM-DIP-A008766, SAMC • 1♀ Otjitambi Farm, 43 km ESE Kamanjab; 19°44'47"S, 015°11'15"E; 13–15 Feb. 1972; BMNH Southern Africa Expedition leg.; NHMUK013445838, ***Paratype*** *Anypodetus unicolor*, NHMUK • 1♀ same data; NHMUK013445841, ***Paratype*** *Anypodetus unicolor*, NHMUK • 1♀ Outjo; 20°06'21"S, 016°08'59"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008764, SAMC.

Namibia – Ohangwena • 1♂ Mafa; 17°37'30"S, 016°07'30"E; Feb. 1923; Mus. Exped. leg.; SAM-DIP-A008762, SAMC • 1♀ same data; NHMUK013445843,

Paratype *Anypodetus unicolor*, NHMUK • 1♀ same data; NHMUK013445844, ***Paratype*** *Anypodetus unicolor*, NHMUK.

Namibia – Omusati • 1♀ Ongandjera; 17°55'00"S, 015°05'34"E; Mar. 1923; NHMUK013445845, ***Paratype*** *Anypodetus unicolor*, NHMUK.

Namibia – Oshana • 1♂ Ondongoa (= Ondangwa); 17°54'26"S, 015°58'33"E; Feb. 1921; Barnard, H. leg.; SAM-DIP-A008763, SAMC.

Namibia – Oshikoto • 1♂ Tsumeb, 5 km SW, road 1/9; 19°19'00"S, 017°39'00"E; 22 Mar. 1984; Londt, Jason, Stuckenberg, Brian leg.; mixed woodland with sandy soil; NMSA.

Namibia – Otjozondjupa • 1♀ Farm Marburg, Otjiwarongo; 20°04'24"S, 016°44'58"E; 25 Dec. 1954; Werner, G. leg.; AAM-010182, SMNS • 1♀ same data; AAM-010183, SMNS • 1♀ same data; AAM-010184, SMNS • 1♂ same data; AAM-010185, SMNS • 1♀ Okahandja; 21°58'19"S, 016°54'23"E; 17 Jan. 1970; Lindner, E. leg.; AAM-010178, SMNS • 1♀ same data; AAM-010179, SMNS • 1♂ same data; AAM-010180, SMNS • 1♂ same data; AAM-010181, SMNS • 1♀ same data; AAM-010178, SMNS • 1♂ same data; AAM-010179, SMNS • 1♀ same data; AAM-010180, SMNS • 1♂ same data; AAM-010181, SMNS • 1♀ Otjituo (= Otjituuo); 19°38'25"S, 018°35'43"E; Jan. 1920; Tucker, R. leg.; SAM-DIP-A008761, SAMC • 1♂ Otjituo (= Otjituuo); 19°38'25"S, 018°35'43"E; Jan. 1920; Tucker, R. leg.; SAM-DIP-A008761, SAMC • 1♀ Waterberg National Park entrance, Road 251; 20°32'00"S, 017°20'00"E; 22 Mar. 1984; Stuckenberg, Brian, Londt, Jason leg.; Acacia thornveld; NMSA-DIP-008959, NMSA • 1♂ same data; NMSA-DIP-097011, NMSA.

South Africa – Gauteng • 1♂ Boekenhoutskloof; 24°27'00"S, 028°10'00"E; 05 Nov. 1977; Bernon, G. leg.; NMSA-DIP-008964, NMSA.

South Africa – Limpopo • 1♂ Blouberg Nature Reserve; 23°02'00"S, 029°04'00"E; 884 m a.s.l.; 22 Nov. 1997; Barraclough, D., James, A. leg.; bushveld; NAMS-DIP-008965, NMSA • 1♀ Nylsvley, Naboomspruit; 24°39'00"S, 028°40'00"E; 1000 m a.s.l.; 12 Dec. 1975; Holm, E., Kirsten, P., Scholtz, C., Savanna Ecosystem Research Project leg.; NMSA-DIP-008958, NMSA.

South Africa – North-West • 1♂ Lichtenburg; 26°08'50"S, 026°09'37"E; Brauns, J. leg.; **Lectotype**, SNSB-ZSM • 1♀ Lichtenburg; 26°08'50"S, 026°09'37"E; Brauns, J. leg.;, Paralectotype, SNSB-ZSM • 1♀ Molopo Game Reserve, Motopi camp area; 25°50'55"S, 022°55'45"E; 14 Mar. 2003; Londt, Jason leg.; dry Acacia savanna; NAMS-DIP-8970, NMSA • 1♀ Vryburg; 26°57'00"S, 024°44'00"E; Oct. 1939; Museum Staff leg.; SAM-DIP-A007906, SAMC • 1♀ same data; SAM-DIP-A007906, SAMC • 1♂ same data; SAM-DIP-A007906, SAMC • 1♂ same data; SAM-DIP-A007906, SAMC.

South Africa – Northern Cape • 1♀ Bloubos farm, 10 km W; 28°07'00"S, 020°45'00"E; 900 m a.s.l.; 17 Mar. 1991; Londt, Jason, Whittington, A. leg.; red dunes; NAMS-DIP-008960, NMSA • 1♂ Groblershoop, 4 km SE; 28°57'00"S, 022°01'00"E; 900 m a.s.l.; 18 Mar. 1991; Londt, Jason, Whittington, A. leg.; red dune grassland; NAMS-DIP-008967, NMSA • 1♀ Hotazel, 20 km N; 27°01'15"S, 022°49'00"E; 1050 m a.s.l.; 14 Mar. 1999; Whittington, A., Londt, Jason leg.; Kuruman river banks; NAMS-DIP-008963, NMSA • 1♂ Narugas; 28°22'30"S,

020°07'30"E; Jan. 1919; SAM Museum Staff leg.; SAM-DIP-A007907, SAMC • 1♂ Newcastle Farm; 27°46'00"S, 023°21'00"E; 29–30 Jan. 1979; Lamoral, B. leg.; NMSA-DIP-008956, NMSA • 1♂ Olivier; 26°36'00"S, 022°41'00"E; 01 Mar. 1980; Whitehead, V. leg.; SAM-DIP-A008767, SAMC • 1♀ Witsand Farm; 28°32'00"S, 022°30'00"E; 02–04 Feb. 1974; Lamoral, B., Bampton, I., Barnley, J. leg.; Malaise trap; NAMS-DIP-008957, NMSA • 1♂ Witsand Nature Reserve; 28°34'49"S, 022°28'43"E; 06 Mar. 2001; Londt, Jason leg.; white sand, low vegetation, few trees; NAMS-DIP-008951, NMSA • 1♀ Witsand Nature Reserve; 28°33'40"S, 022°29'39"E; 1200 m a.s.l.; 30 Jan.–02 Feb. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savanna, red sandy ridge; USNMENT00870115, USNM • 1♂ same data; USNMENT00870116, USNM • 1♂ Witsand Nature Reserve; 28°33'37"S, 022°29'06"E; 1160 m a.s.l.; 31 Jan.–01 Feb. 2004; Londt, Jason, Dikow, Torsten leg.; Acacia savanna + white sand dune area; USNMENT00870112, USNM • 1♂ same data; USNMENT00870113, USNM • 1♀ same data; USNMENT00870114, USNM • 1♂ Witsand Nature Reserve; 28°33'51"S, 022°29'11"E; 11 Nov. 2011; Londt, Jason, Londt, A. leg.; white sand, low vegetation, few trees; NAMS-DIP-188711, NMSA.

Zimbabwe – Matabeleland North • 1♂ Lupani (= Lupane); 18°55'50"S, 027°45'34"E; Dec. 1938; National Museum Southern Rhodesia leg.; NMZ2725, NMBZ • 1♀ same data; NMZ2747, NMBZ • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 31 Dec. 1921; Rhodesia Museum leg.; NHMUK013445831, ***Holotype*** *Anypodetus rigidis* Oldroyd, 1974, NHMUK • 1♀ Victoria Falls; 17°55'00"S, 025°50'00"E; 17 Feb. 1920; Rhodesia Museum leg.; NMZ2726, NMBZ.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa except Mozambique to date (Fig. 52). A commonly observed and collected species known from 85 specimens from 35 collecting events between 1919–2018 and a single observation at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from late spring to late summer (October–March) (Table 3). Engel and Cuthbertson (1934) report grasshoppers as prey but no predator or prey specimens were studied by them. Specimens collected by the senior author have been recorded on or near sand dunes perching on sand or vertically on low vegetation (see Figs 1, 2).

Anypodetus fascipennis Engel, 1924

Figs 3, 4, 24–29, 52

Anypodetus semirufus Engel, 1924 – synonymy *sensu* Oldroyd 1974: 90.
Anypodetus maculipennis Ricardo, 1925 – synonymy *sensu* Engel and Cuthbertson 1934: 43.

Taxon depository for *Anypodetus fascipennis*. ZooBank: https://zoobank.org/BB-65F2F8-7A94-4F30-9683-A1F286B3E141;
GBIF: https://www.gbif.org/species/1664903;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F04B-9D42-FF58-FA0BDE1941E7;

iNaturalist: https://www.inaturalist.org/taxa/650535-Anypodetus-fascipennis.

Taxon depository for *Anypodetus semirufus*. ZooBank: https://zoobank.org/F6EF960F-426E-4015-BF13-509B3EACF10D;

GBIF: https://www.gbif.org/species/1664901.

Taxon depository for *Anypodetus maculipennis*. ZooBank: https://zoobank.org/FD892EEF-11B9-470F-BF09-CA49E10C92E0;

GBIF: https://www.gbif.org/species/1664902.

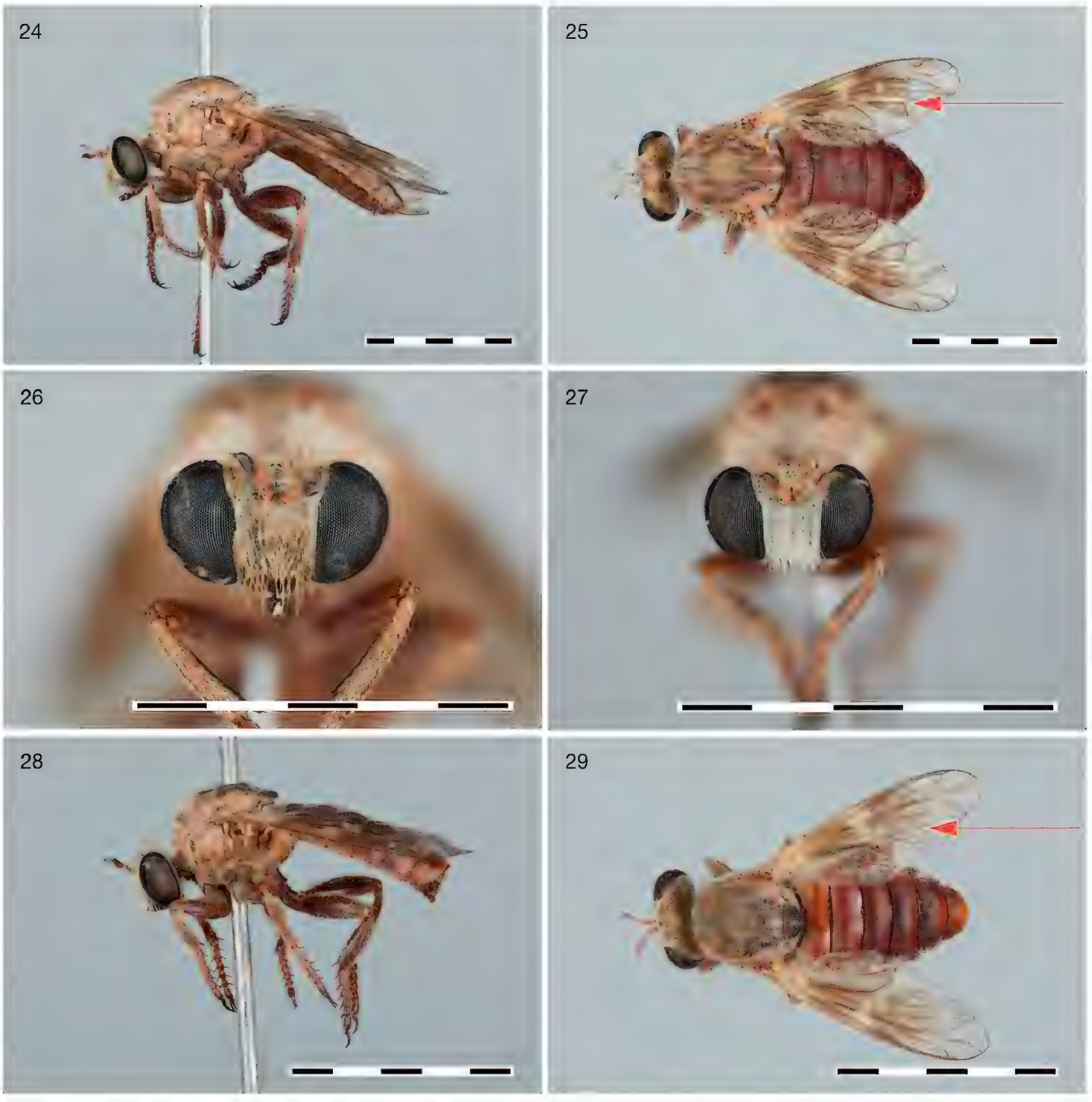
Diagnosis. The species is distinguished from congeners by the brown-stained anterior half of the wings with white transverse bands, the lateral frons being strongly developed with 3–4 short, yellow proclinate macrosetae, the circular macrosetae (female yellowish and black, male white) in the mystax, and the proximal portion of vein M_2 and the distal portion of vein M_3 not aligned.

Type locality. South Africa: Eastern Cape: Willowmore (33°17'00"S, 023°29'00"E, -33.28333, 23.48333).

Material examined. Botswana – Central • 1♀ Palapye; 22°33'00"S, 027°08'00"E; 18 Oct. 1923; Stevenson, R. leg.; SAM-DIP-A007912, SAMC • 1♂ Serowe; 22°25'00"S, 026°44'00"E; 1000 m a.s.l.; 28 Nov. 1980; Forchhammer, P. leg.; Malaise trap; NMSA-DIP-008961, NMSA • 1♂ same data; NMSA-DIP-097062, NMSA • 1♂ same data; NMSA-DIP-008963, NMSA • 1♂ same locality; 23 Oct. 1982; Forchhammer, P. leg.; NMSA-DIP-008992, NMSA • 1♀ same locality; 26 Nov. 1982; Forchhammer, P. leg.; NMSA-DIP-008984, NMSA • 1♂ same data; NMSA-DIP-097017, NMSA • 1♂ same locality; 21 Dec. 1982; Forchhammer, P. leg.; NMSA-DIP-008981, NMSA • 1♀ same locality; Oct. 1985; Forchhammer, P. leg.; NMSA-DIP-008968, NMSA • 1♀ same data; NMSA-DIP-097076, NMSA • 1♂ same data; NMSA-DIP-097074, NMSA • 1♀ same locality; Dec. 1985; Forchhammer, P. leg.; NMSA-DIP-008994, NMSA • 1♀ same locality; 08 Nov. 1988; Forchhammer, P. leg.; NMSA-DIP-008979, NMSA • 1♀ same locality; 09 Nov. 1988; Forchhammer, P. leg.; NMSA-DIP-008974, NMSA • 1♂ same data; NMSA-DIP-097018, NMSA • 1♀ same locality; Oct. 1989; Forchhammer, P. leg.; NMSA-DIP-097064, NMSA • 1♀ same data; NMSA-DIP-097065, NMSA • 1♀ same data; NMSA-DIP-097066, NMSA • 1♀same data; NMSA-DIP-097067, NMSA • 1♀ same locality; Nov. 1989; NMSA-DIP-008966, NMSA • 1♀ same data; NMSA-DIP-008968, NMSA • 1♀ same data; NMSA-DIP-097069, NMSA • 1♀ same data; NMSA-DIP-097070, NMSA • 1♀ same data; NMSA-DIP-097071, NMSA • 1♀ same data; NMSA-DIP-097072.

Namibia • 1♀ Namibia; Mar. 1923; Mus. Exped. leg.; NMSA-DIP-008972, NMSA • 1♀ Südwest-Afrika (= Namibia), F 274; Werner, G. leg.; AAM-010186, SMNS • 1♀ Südwest-Afrika (= Namibia), F 292; 04 Dec. 1955; Werner, G. leg.; AAM-010187, SMNS.

Namibia – Erongo • 1♀ Portsmut Farm 33, Hakos Mts.; 23°06'00"S, 016°25'00"E; 07 Feb. 1969; Lamoral, B. leg.; NMSA-DIP-008973, NMSA.



Figures 24–29. *A. fascipennis* **24** ♀ (USNMENT01115204), lateral **25** same, dorsal **26** same, head anterior **27** ♂ (USNMENT01115113), head anterior **28** same, lateral **29** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

Namibia – Karas • 1♂ Warmbad; 28°27'00"S, 018°44'00"E; Feb. 1925; S.W. Africa Museum Expedition leg.; SAM-DIP-A008755, SAMC.

Namibia – Khomas • 1♀ Fort Francois, along C28 W Windhoek; 22°40'08"S, 016°37'15"E; 1633 m a.s.l.; 31 Jan. 2012; Dikow, Torsten leg.; bushland, perching on ground; USNMENT00832179, USNM.

Namibia – Kunene • 1♀ Epupa Falls; 17°00'00"S, 013°15'00"E; 19–21 Feb. 1994; Koch, F. leg.;, MFN • 1♀ same data; MFN • 1♀ same locality; 20–22 Feb. 1994; Koch, F. leg.; MFN • 1♀ Kaross; 19°30'00"S, 014°20'00"E; Feb. 1925; S.W. Africa Museum Expedition leg.; SAM-DIP-A008760, SAMC • 1♀ Outjo; 20°06'21"S,

016°08'59"E; Jan. 1925; Museum Staff leg.; SAM-DIP-A008758, SAMC • 1♀ Ruacana Falls; 17°24'05"S, 014°12'54"E; 23–24 Feb. 1994; Koch, F. leg.; MFN • 1♀ same data; MFN • 1♀ same data; MFN.

Namibia – Omaheke • 1♀ Gobabis, 130 km S; 23°33'34"S, 019°06'52"E; 30 Dec. 1960; Haacke, W. leg.; NMSA-DIP-008976, NMSA • 1♂ same data; NMSA-DIP-097016, NMSA.

Namibia – Oshikoto • 1♂ Tsumeb, 45 km S; 19°27'09"S, 017°35'24"E; 10 Dec. 1956; NMSA-DIP-008978, NMSA.

South Africa – Eastern Cape • 1♀ Aberdeen Nature Reserve; 32°28'18"S, 024°02'22"E; 762 m a.s.l.; 04 Dec. 2015; collected a.m. (9:00–noon); Dikow, Torsten leg.; Acacia bushveld and dry pan, perching on low vegetation; USNMENT01115181, USNM • 1♂ same data; USNMENT01115034, USNM • 1♂ same data; USNMENT01115113, USNM • 1♀same data; USNMENT01115114, USNM • 1♂ same data; USNMENT01115164, USNM • 1♀same data; USNMENT01115172, USNM • 1♀ same data; USNMENT01115204, USNM • 1♂ Aberdeen Nature Reserve; 32°28'11"S, 024°01'23"E; 760 m a.s.l.; 05 Dec. 2015; collected a.m. (9:00–noon); Dikow, Torsten leg.; Acacia bushveld and dry pan, perching on low vegetation; USNMENT01115258, USNM • 1♀ 1♂ same data; in copula; USNMENT01115269, USNM • 1♂ Graaf-Reinet, 22 km SE, on Pearston Rd; 32°27'00"S, 024°38'00"E; 750 m a.s.l.; 07 Dec. 1989; Londt, Jason, Londt, A. leg.; open Karoo scrub/flowers; NAMS-DIP-008999, NMSA • 1♀ Willowmore; 33°17'00"S, 023°29'00"E; Feb. 1907; Brauns, J. leg.; NMSA-DIP-008980, NMSA • 1♀ same locality; 20 Jan. 1908; Brauns, J. leg.; NMSA-DIP-008977, NMSA • 1♂ same locality; 01 Jan. 1909; Brauns, J. leg.; NMSA-DIP-008995, NMSA • 1♀ same locality; 10 Feb. 1909; Brauns, J. leg.; NMSA-DIP-008988, NMSA • 1♂ same locality; Dec. 1912; Brauns, J. leg.; NMSA-DIP-008997, NMSA • 1♀ same locality; 01 Jan. 1913; Brauns, J. leg.; NMSA-DIP-008982, NMSA • 1♀ same data; NMSA-DIP-097037, NMSA • 1♂ same locality; 02 Jan. 1913; Brauns, J. leg.; SAM-DIP-A007908, SAMC • 1♂ same locality; 01 Jan. 1915; Brauns, J. leg.; USNMENT01141005, USNM • 1♀same locality; 01 Jan. 1919; Brauns, J. leg.; USNMENT01141005, USNM • 1♀ same locality; Dec. 1920; Brauns, J. leg.; NMSA-DIP-008986, NMSA • 1♂ same locality; 05 Jan. 1922; Brauns, J. leg.; NMSA-DIP-008983, NMSA • 1♂ same locality; 10 Dec. 1922; Brauns, J. leg.; NMSA-DIP-008985, NMSA • 1♂ same locality; 03 Jan. 1926; Brauns, J. leg.; USNMENT01141004, USNM.

South Africa – Free State • 1♀ Bloemfontein district; 29°10'00"S, 026°00'00"E; 12 Dec. 1920; Munro, H. leg.; NMSA-DIP-008991, NMSA.

South Africa – Gauteng • 1♀ Pretoria; 25°44'00"S, 028°11'00"E; Jan. 1919; Brauns, J. leg.; NMSA-DIP-097035, NMSA • 1♂ same data; NMSA-DIP-097036, NMSA • 1♀ same data; USNMENT01831271, USNM • 1♀ same locality; Jan. 1920; Brauns, J. leg.; NMSA-DIP-024273, NMSA.

South Africa – Limpopo • 1♀ Beacon Ranch, 20 km NW Gravelotte; 23°52'42"S, 030°27'25"E; 17 Nov. 1978; Brothers, D., Guillarmond, J. leg.; NMSA-DIP-008990, NMSA • 1♂ same data; NMSA-DIP-097014, NMSA • 1♂ Moorddrift; 24°17'00"S, 028°57'00"E; 07–19 Oct. 1907; Swierstra, C. leg.; NMSA-DIP-008975, NMSA • 1♂same data; NMSA-DIP-097015, NMSA.

South Africa – Mpumalanga • 1♂ Kaapmuiden; 25°32'00"S, 031°19'00"E; 30 Oct. 1918; Tucker, R. leg.; SAM-DIP-A007910, SAMC.

South Africa – North-West • 1♀ Delarey (= Delareyville); 26°41'08"S, 25°27'41"E; Jan. 1917; Brauns, J. leg.; NMSA-DIP-097021, NMSA • 1♀ same data; NMSA-DIP-097022, NMSA • 1♀ same data; NMSA-DIP-008987, NMSA • 1♂ same locality; Jan. 1919; Brauns, J. leg.; NMSA-DIP-008998, NMSA • 1♀ same locality; Jan. 1919; Brauns, J. leg.; NMSA-DIP-097023, NMSA • 1♀ same data; NMSA-DIP-097024, NMSA • 1♂ same data; NMSA-DIP-097025, NMSA • 1♂ same data; NMSA-DIP-097026, NMSA • 1♂ same data; NMSA-DIP-097027, NMSA • 1♂ same data; NMSA-DIP-097028, NMSA • 1♂ same data; NMSA-DIP-097029, NMSA • 1♂ same data; NMSA-DIP-097030, NMSA • 1♂ same data; NMSA-DIP-097031, NMSA • 1♂ same data; NMSA-DIP-097032, NMSA • 1♂ same data; NMSA-DIP-097033, NMSA • 1♂ same data; NMSA-DIP-097034, NMSA • 1♂ same data; NMSA-DIP-097196, NMSA • 1♂same data; USNMENT01141006, USNM • 1♀same data; USNMENT01141007, USNM • 1♂ same data; USNMENT01141006, USNM • 1♀ Vryburg; 26°57'00"S, 024°44'00"E; Oct. 1939; Museum Staff leg.; SAM-DIP-A007909, SAMC.

South Africa – Northern Cape • 1♀ Hopetown, 16 km W; 29°36'46"S, 023°54'32"E; 27 Jan. 1930; Munro, H. leg.; SANC • 1♂ same data; SANC • 1♀ Upington, 35 km WNW; 28°21'23"S, 020°54'46"E; 20 Mar. 1980; Londt, Jason, Schoeman, L. leg.; roadside vegetation; NAMS-DIP-008996, NMSA • 1♂ same data; NMSA-DIP-097013, NMSA.

South Africa – Western Cape • 1♀ Merweville; 32°40'00"S, 021°31'00"E; Feb. 1941; Zinn, H. leg.; SAM-DIP-A007911, SAMC.

Zimbabwe – Bulawayo • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; 19 Oct. 1919; Rhodesia Museum leg.; NHMUK013445833, Paralectotype *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♀ same locality; 14 Oct. 1922; Rhodesia Museum leg.; NHMUK013445834, Paralectotype *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♂ same locality; Nov. 1922; Stevenson, R. leg.; NMSA-DIP-009000, NMSA • 1♀ same locality; 12 Oct. 1923; Stevenson, R. leg.; SAM-DIP-A007914, SAMC • 1♂ same data; SAM-DIP-A007914, SAMC • 1♂ same locality; 04 Nov. 1923; Stevenson, R. leg.; SAM-DIP-A007913, SAMC • 1♀ Bulawayo; 20°09'00"S, 028°35'00"E; 1924; Stevenson, R. leg.; NMSA-DIP-009001, NMSA.

Zimbabwe – Harare • 1♂ Hillside; 17°50'00"S, 031°05'00"E; Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-009007, NMSA • 1♀ same locality; 05 Nov. 1922; Swinburne, Stevenson, R. leg.; NMSA-DIP-009003, NMSA • 1♂ same data; USNMENT01831270, USNM • 1♀ same locality; 04 Feb. 1923; Swinburne, Stevenson, R. leg.; NMSA-DIP-009002, NMSA.

Zimbabwe – Matabeleland North • 1♀ Khami; 20°09'30"S, 028°22'36"E; 01 Oct. 1938; National Museum Southern Rhodesia leg.; NMZ2733, NMBZ • 1♂ Sawmills; 19°35'00"S, 028°02'23"E; 12 Nov. 1920; Rhodesia Museum leg.; NHMUK013445832, ***Lectotype*** *Anypodetus maculipennis* Ricardo, 1925, NHMUK • 1♀ same locality; 12 Oct. 1923; Rhodesia Museum leg.; NMZ2728, NMBZ • 1♂ same locality; 14 Nov. 1924; Stevenson, R. leg.; NMSA-DIP-008993, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known from throughout southern Africa except Mozambique to date (Fig. 52). A commonly observed and collected species known from 121 specimens from 31 collecting events between 1907–2015 and three observations at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active from late spring to late summer (October–March) (Table 3). Specimens collected by the senior author have been recorded perching on ground or on low vegetation (see Figs 3, 4).

Remarks. Ricardo (1925: 242) described *A. maculipennis* on 'Type (male) from Saw Mills, S. Rhodesia. Type (female) from Bulawayo, and other males and females from the same locality (Rhodesia Museum).' In doing so she did not designate a holotype so all her listed specimens must be considered syntypes. The NHMUK specimens of *A. maculipennis* were labeled as Syntypes by J. Chainey in 1984. Londt (2000: 134) designated 'the male as lectotype and the female as paralectotype' but none of the specimens are labeled as such and there are more than two specimens. We hereby designate the male from Sawmills as Lectotype (NHMUK013445832) in order to stabilize the species concept and the other two female specimens from Bulawayo in the NHMUK as Paralectotypes (NHMUK013445833 and NHMUK013445834).

Londt (1998) reported on a specimen from Willowmore that was identified by F. Hermann as '*A. varipennis*', which represents an unpublished name. The specimen in the NMSA (NMSA-DIP-008988) has been studied and verified to represent *A. fascipennis*.

Anypodetus leucothrix Londt, 2000

Figs 30–35, 51

Taxon depository. ZooBank: https://zoobank.org/53216348-9B29-4704-8DD6-22AB60B0B84B;

GBIF: https://www.gbif.org/species/1664904;

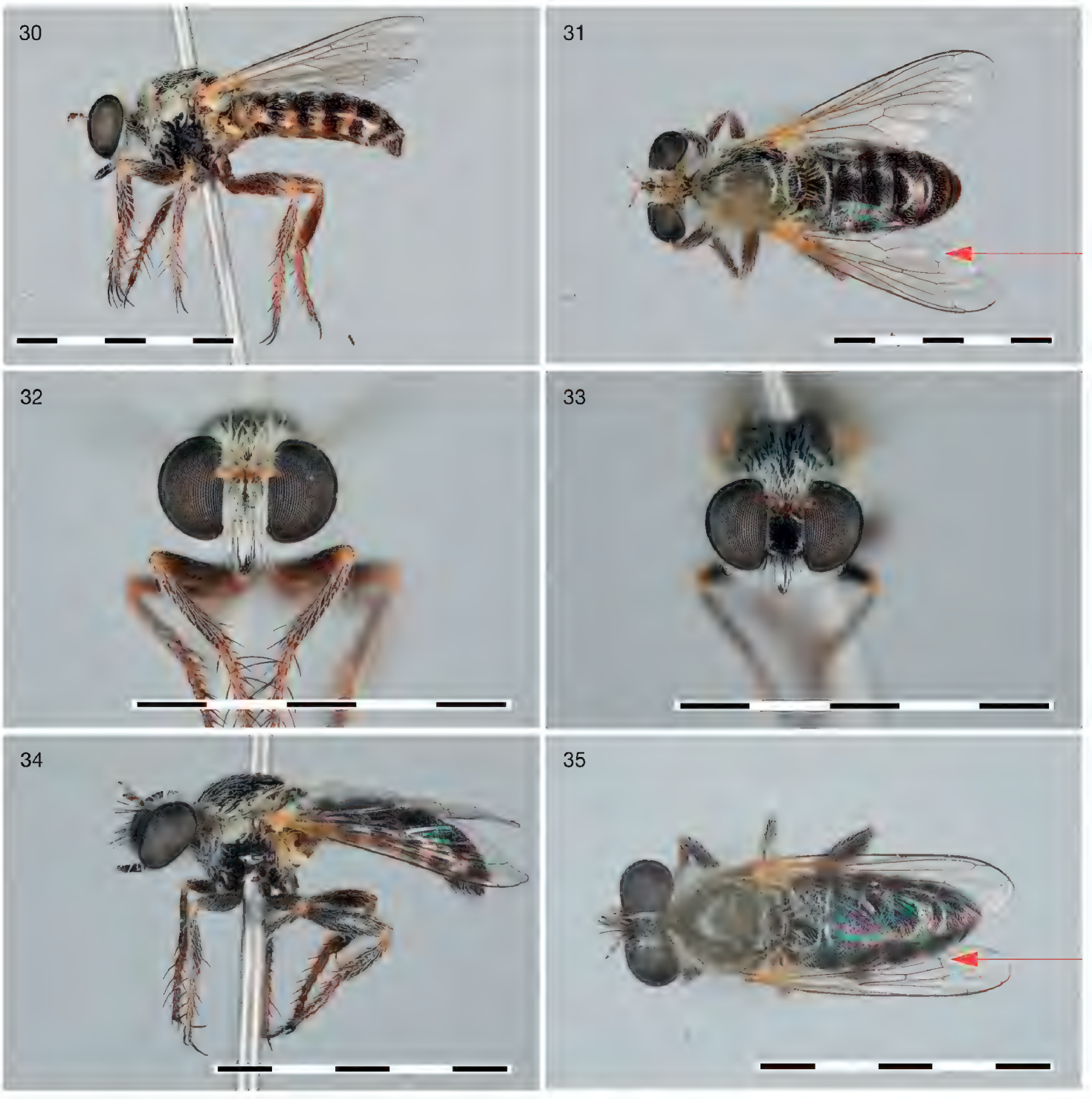
Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-FD2EDB6A4187;

iNaturalist: https://www.inaturalist.org/taxa/650536-Anypodetus-leucothrix.

Diagnosis. The species is distinguished from congeners by the predominantly apubescent pleura and scutum, the whitish to yellowish setation on the entire body, and the hyaline wings.

Type locality. South Africa: Western Cape: Gamka River, 40 km N Prince Albert (32°54'18"S, 021°58'40"E, -32.905, 21.97778).

Material examined. Namibia – Erongo • 1♂ Namib-Skeleton Coast National Park, off C14; 23°34'22"S, 015°48'37"E; 922 m a.s.l.; 26 Sep. 2017; collected a.m. (9:00–noon); Dikow, Torsten leg.; sparsely vegetated sand dune, perching on sand; USNMENT01384022, USNM • 1♀ same data; USNMENT01384040, USNM • 1♂ Namib-Naukluft National Park, off C14; 23°34'25"S, 015°48'39"E; 917 m a.s.l.; 20 Nov. 2018; collected a.m. (9:00–noon); Dikow, Torsten leg.; sparsely vegetated sand dune, perching on sand; USNMENT01518038, USNM • 1♂ same



Figures 30–35. *A. leucothrix* **30** ♀ (USNMENT01384040), lateral **31** same, dorsal **32** same, head anterior **33** ♂ (USNMENT01519504), head anterior **34** same, lateral **35** same, dorsal. Scale bars: 5 mm, red arrow = vein M_2 and M_3 alignment.

data; USNMENT01518039, USNM • 1♀ Namib-Naukluft National Park, off C14; 23°34'26"S, 015°48'38"E; 912 m a.s.l.; 27 Sep. 2019; collected a.m. (9:00–noon); Dikow, Torsten, Cabrero, A. leg.; margin of partly vegetated dune, perching on sand; USNMENT01519503, USNM • 1♂ same data; USNMENT01519504, USNM.

Namibia – Karas • 1♀ Ai-Ais Fish River Canyon; 27°55'00"S, 017°29'00"E; 07–08 Oct. 1993; Koch, F. leg.;, ***Paratype***, MFN • 1♂ Great Karas Mountains; 27°20'00"S, 018°45'00"E; Nov. 1936; SAM Museum Staff leg.; SAM-DIP-A008774, ***Paratype***, SAMC.

Namibia – Khomas • 1♂ Hakos Mountains, 191 km E Walvis Bay; 23°14'43"S, 016°17'22"E; 12 Nov. 1963; Moore, A. leg.; USNMENT01140564, USNM • 1♀ same data; USNMENT01140565, USNM • 1♀ same data; USNMENT01140566,

USNM • 1♂ same data; USNMENT01140567, USNM • 1♂ same data; USNMENT01140554, USNM • 1♀ same data; USNMENT01140555, USNM • 1♀ same data; USNMENT01140556, USNM • 1♀ same data; USNMENT01140557, USNM • 1♀ same data; USNMENT01140558, USNM • 1♀ same data; USNMENT01140559, USNM • 1♀ same data; USNMENT01140560, USNM • 1♀ same data; USNMENT01140561, USNM • 1♂ same data; USNMENT01140562, USNM • 1♂ same data; USNMENT01140563, USNM.

Namibia – Otjozondjupa • 1♂ Otjiwarongo, Omarassa; 20°08'57"S, 016°53'35"E; 25 Sep. 1954; Werner, G. leg.; AAM-010172, SMNS • 1♂ same data; AAM-010173, SMNS • 1♀ same data; AAM-010174, SMNS • 1♀ same data; AAM-010175, SMNS • 1♀ same data; AAM-010176, SMNS • 1♀ same data; AAM-010177, SMNS.

South Africa – Northern Cape • 2♀ Nieuveld Escarpment, Rietvlei; 32°20'00"S, 021°30'00"E; Feb. 1925; SAM Museum Staff leg.; SAM-DIP-A008773, ***Paratype***, SAMC.

South Africa – Western Cape • 1♂ Gamka River, 40 km N Prince Albert; 32°54'18"S, 021°58'40"E; 500 m a.s.l.; 11 Nov. 1986; Londt, Jason, Quickelberge, C. leg.; sandy areas / acacias; NAMS-DIP-09022, ***Holotype***, NMSA • 1♀ Laingsburg, 70 km E, dry Dwyka River area; 33°06'00"S, 021°35'00"E; 500 m a.s.l.; 24 Nov. 1990; Whittington, A., Londt, Jason leg.; NMSA-DIP-009011, ***Paratype***, NMSA • 1♂ same data; NMSA-DIP-082948, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from south-western South Africa and Namibia (Fig. 51). A rarely observed and collected species known from 33 specimens from 10 collecting events between 1925–2019 and a single observation at iNaturalist (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in spring (September–November) and late summer (February) (Table 3). Specimens collected by the senior author have been recorded on or near vegetated dunes perching on sand.

Remarks. The collection of this species by the senior author in the Namib Desert initiated interest in reviewing this genus. At first, the specimens collected could not be readily identified using the key in Londt (2000). In that key, *A. leucothrix* is keyed primarily through the wing venation being similar to *A. fascipennis* in which the proximal portion of vein M_2 and the distal portion of vein M_3 are not aligned (see Figs 25, 29). The collected specimens, however, showed a complete (or near complete) alignment of M_2 and M_3 (Figs 31, 35). Because of the considerable distance of the Namib Desert locality to the localities of the two paratypes in southern Namibia and the type locality in south-western South Africa (Fig. 51), it was postulated that the collected specimens represent a species new to science. Only a detailed study of the male terminalia comparing them to the illustrations by Londt (2000) and photographs of the holotype in the NMSA supported the conclusion that the Namibian specimens belong to *A. leucothrix*. Additional specimens collected in 1954 (in SMNS) and 1963 (in USNM) further north in Namibia added to the understanding that there is wing venation variation within *A. leucothrix*.

Londt (2000) stated that this species is somewhat different from all other *Anypodetus* species in that the thorax is primarily apubescent (all other known species have a pubescent thorax) and the scutellum has long apical scutellar setae (apical scutellar setae ab-

sent in other species). In contrast, the basic morphology of the male terminalia is identical to all other known species of *Anypodetus* (see figures in Londt 2000). Furthermore, the lack of pulvilli, the absence of a macroseta on the supero-posterior anepisternum, and the sexual dimorphism in the mystax coloration and development are features shared among all *Anypodetus* species recognized here including *A. leucothrix*.

***Anypodetus londti* sp. nov.**
https://zoobank.org/6347D6F5-A3C1-4857-81C4-2B2E60A060D9
Figs 36–38, 51

Diagnosis. The species is distinguished from congeners by the male mystax with very long white, tightly packed, dorso-ventrally flattened macrosetae, and the long black medial macrosetae on abdominal tergites 2–6.

Etymology. The species is named after Jason G.H. Londt in celebrating his career with the present *Festschrift* in the year of his 80th birthday. Jason is, without doubt, the most knowledgeable Afrotropical Asilidae taxonomist, present and past.

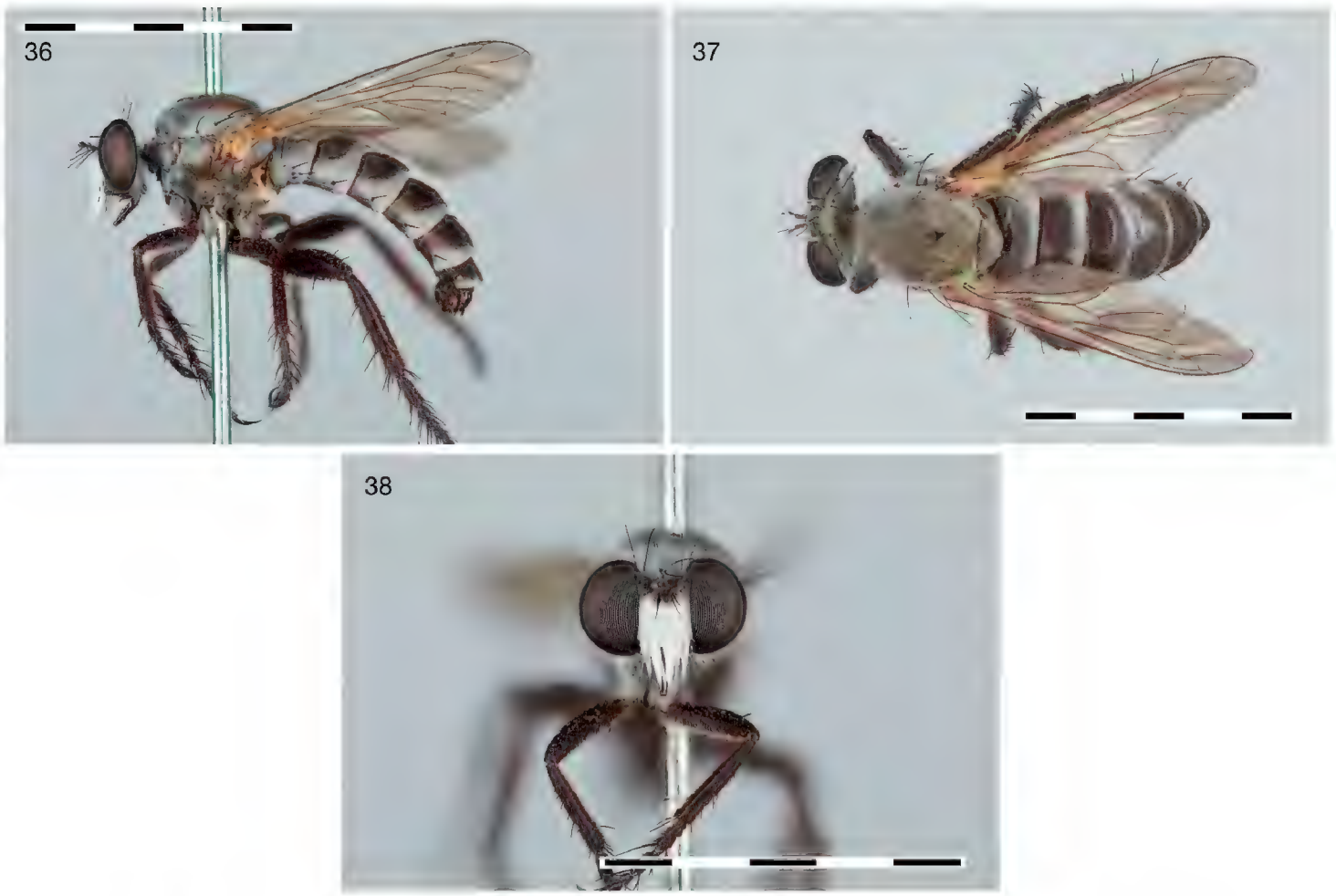
Description. Female. Unknown.

Male. ***Head*:** wider than high, black; vertex sharply depressed (90° angle on lateral margin of compound eyes); facial swelling indistinct, only ventral margin slightly developed, silver pubescent; mystax white, long dorso-ventrally flattened setae, only epistomal margin with long, black, circular macrosetae, extending over entire face, short, reaching tip of proboscis; ommatidia of different size, at least some median ommatidia distinctly larger; postgena posterior margin simple, smooth; frons (at level of antennal insertion) more or less parallel-sided, gray pubescent, laterally short white setose with single long black macroseta; ocellar tubercle gray pubescent, white setose, 2 long black macrosetae; vertex gray pubescent, white setose; median occipital sclerite (m ocp scl) long white setose; postocular (pocl) setae straight, long black macrosetae; occiput predominantly gray pubescent, white setose; compound eye posterior margin (in lateral view) straight or slightly curved throughout.

***Proboscis and maxillary palpus*:** proboscis straight, dark brown; postmentum plate-like, straight, ventral margin entirely smooth, white setose ventrally; prementum circular, with dorso-median flange, asetose; labella reduced, fused to prementum only ventrally, only forming distal tip of proboscis, apically rounded, yellowish setose; maxillary palpus brown, two-segmented, white setose, cylindrical; stipites fused entirely medially, apubescent, long white setose.

***Antenna*:** light brown to brown, lightly gray pubescent; scape approximately as long as pedicel, short black setose dorsally and long black macrosetose ventrally, macrosetae very long, reaching tip of postpedicel; pedicel short black setose ventrally, long black setose laterally; postpedicel medially broadest, long, approximately 2× as long as scape and pedicel combined, asetose; stylus comprised of 1 element, 0.25× as long as postpedicel, asetose; apical seta-like sensory element situated apically in cavity on stylus.

***Thorax*:** dark brown; prosternum gray pubescent, fused to proepisternum, broad prosternum; proepisternum gray pubescent, long white setose; cervical sclerite long



Figures 36–38. *A. londti* sp. nov. **36** ♂ holotype (USNMENT01140568), lateral **37** same, dorsal **38** same, head anterior. Scale bars: 5 mm.

yellowish setose; antepronotum gray pubescent, long yellowish setose with long yellowish macrosetose medially; postpronotum gray pubescent, long white setose; postpronotal lobe gray pubescent, short white setose, single black macroseta; pleuron gray pubescent; proepimeron gray pubescent, long white setose anteriorly; anepisternum gray pubescent in dorsal ½, brown pubescent in ventral ½, long white setose dorsally, supero-posteriorly white setose (not macrosetose); anterior basalare asetose, posterior basalare asetose; anepimeron predominantly brown pubescent, asetose; katepisternum gray pubescent, asetose; katepimeron gray pubescent, asetose; katatergite gray pubescent, long black macrosetose; meron + metanepisternum gray pubescent, predominantly asetose, long brown setose posteriorly; metakatepisternum gray pubescent, asetose; metepimeron gray pubescent, asetose; anatergite gray pubescent, asetose; scutum anteriorly narrowly gray pubescent, laterally broadly gray pubescent, medially predominantly brown pubescent, scutum setation: anteriorly and laterally short white setose, remainder short brown setose, setae with small sockets, 1 npl seta, 2 spa setae, 2 pal setae, dc setae absent, acr setae absent, median posterior scutum (between dc setae) short brown setose, setae directed posteriorly; scutellum gray pubescent, ds sctl setae present, short brown setae, ap sctl setae absent; postmetacoxal area entirely membranous.

***Leg*:** brown to dark brown, apubescent, all setae circular in cross section; pro coxa dark brown, gray pubescent, long white setose, long black macrosetose distally; pro femur dark brown, short brown setose dorsally, short white setose ventrally, black macrosetose: 3–4 in 1 antero-proximal row, 1 macroseta dorso-distally; pro tibia dark

brown, short brown setose, black macrosetose: 3 in 1 dorsal row, 4 in 1 posterior row, 4 long in 1 postero-ventral row, 1 macroseta and 3 long setae in antero-ventral row, distal tip with 5 long black macrosetae; mes coxa dark brown, gray pubescent, white setose, black macrosetose distally; mes femur dark brown, short brown setose dorsally, short white setose ventrally, black macrosetose: 2–3 in 1 antero-proximal row, 1 macroseta antero-distally, 1 macroseta dorso-distally, 1 macroseta postero-distally; mes tibia dark brown, short brown setose, black macrosetose: 3 long in 1 antero-dorsal row, 3–4 long in dorsal row, 3 long in 1 antero-ventral row, 3–4 long in 1 ventral row, distal tip with 7 long black macrosetae; met coxa dark brown, gray pubescent, white setose, anteriorly without any protuberance; met trochanter white setose, 1 black macroseta, cylindrical, medially without any protuberance; met femur dark brown, short brown setose, black macrosetose: 4–5 long in 1 antero-ventral row, 5 long in 1 dorsal row distally, 2 long 1 ventral row proximally; met tibia dark brown, straight, short brown setose, black macrosetose: 3 long in 1 dorsal row, 4 long in anterior row, distal tip with 8 long black macrosetae; proximal pro, mes, and met tarsomeres as long as following 2 tarsomeres combined, proximal met tarsomere as wide as following tarsomeres; pro tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; mes tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; met tarsomeres short brown setose, long black macrosetose laterally and dorso-laterally; pulvilli absent; claw fairly straight throughout, pointed; empodium setiform, well-developed (as long as claw).

***Wing*:** 4.6–5.6 mm, hyaline, evenly microtrichose; C circumambient (developed around entire wing), anterior wing margin in males straight; R_{2+3} distally relatively straight, r_1 closed, R_1 and R_{2+3} meet apically and form a stalk vein (petiolate); R_4 terminating anterior to wing apex, distinctly arching anteriorly, stump vein (R_3) absent; r_4 open, R_4 and R_5 diverging from each other; R_5 terminating posterior to wing apex; r_5 open; M_1 terminating posterior to wing apex; cell d closed by base of M_2, m-m absent (or at least highly reduced), M_2 and M_3 aligned in a line from anterior to posterior, r-m situated in center; m_3 closed and petiolate; cua closed and petiolate; alula well-developed; microtrichia on posterior wing margin arranged in a single plane.

***Abdomen*:** shape compressed, T2–3 distinctly transversely rectangular (length to width ratio > 1:3), dark brown to black, tergites smooth, setae with small sockets only; T1 white and brown setose, laterally with 2–3 long black macrosetae, laterally and posteriorly gray pubescent, medially brown pubescent, entirely sclerotized medially, dorsal surface smooth, without protuberances; T2–8 entirely sclerotized, dark brown, T2–6 laterally and posteriorly gray pubescent, medially brown pubescent, T7–8 apubescent, T2–6 short white setose laterally and posteriorly, short brown setose medially, T7–8 short brown setose, marginal macrosetae absent on T2–7, medial macrosetae present on T2–6, single long black macroseta; S1–8 dark brown, lightly gray pubescent, short brown setose.

Male: T1–T6 and S1–S6 entire, T7–T8 and S7 reduced to ring of sclerites, S8 well-developed; hypopygium dark brown, rotated by 90°, directed posteriorly; epandrium undivided, comprised of single sclerite fused entirely medially; hypandrium reduced, minute triangular sclerite, posterior margin entire, simple (without projections), distinctly separated from epandrium by gonocoxite, not fused to gonocoxite;

gonocoxite entirely free from epandrium; gonocoxal apodeme not observable; gonostylus present, positioned medially on gonocoxite; subepandrial sclerite asetose, ventrally smooth (without protuberances), laterally straight (without protuberances), distal margin simple, straight margin; cerci fused medially; phallus long, tip at tip of gonocoxite and gonostyli, 3 phallic prongs, tip pointed, without any protuberance.

Type locality. Mozambique: Gaza: Massangena (21°32'50"S, 032°57'03"E, -21.54722, 32.95083).

Material examined. Mozambique – Gaza • 1♂ Massangena; 21°32'50"S, 032°57'03"E; 01–08 Feb. 1964; Moore, A. leg.; USNMENT01140568, ***Holotype***, USNM.

Zimbabwe – Matabeleland North • 1♂ Victoria Falls; 17°55'00"S, 025°50'00"E; Dec. 1938; National Museum Southern Rhodesia leg.; NMZ2742, ***Paratype***, NMBZ.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from two localities in southern Mozambique and north-western Zimbabwe (Fig. 51). A rarely collected species known only from two specimens (both males) from two collecting events in 1938 and 1964 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in summer (December and February) (Table 3). Nothing is known of the biology.

Remarks. While the male terminalia illustrations by Londt (2000) have been useful in identifying *A. leucothrix*, the species-specific features are difficult to describe sufficiently. Because only two male specimens in less-than-ideal conditions are known for *A. londti* sp. nov., we decided not to dissect a specimen for illustration in order to preserve entire specimens for future study. Photography of these structures was also not possible because of the orientation of the male terminalia and legs etc. to view all angles properly (Fig. 36). The male terminalia described above provide general features useful to distinguish species of this genus from other Afrotropical Laphriinae. The ventral terminalia aspect with the number of strong macrosetae distally on the gonocoxite is relatively easily viewable in non-dissected specimens. In *A. londti* sp. nov. there are 3–5 such strong macrosetae present (see figs 11–33 in Londt 2000).

Anypodetus macroceros Londt, 2000

Figs 39–41, 52

Taxon depository. ZooBank: https://zoobank.org/15C1B571-6E8A-4EE6-95FD-F883C73E619D;

GBIF: https://www.gbif.org/species/1664900;

Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-FB43D9F14647.

Diagnosis. The species is distinguished from congeners by the unique postpedicel shape in which the apical part is narrowing and appearing as an elongate stylus, which itself is developed regularly (see fig. 6 in Londt 2000), and the densely arranged microtrichia on the wing.

Figures 39–41. *A. macroceros* **39** ♂ holotype (NMSA-DIP-009021), lateral **40** same, dorsal **41** same, head anterior. Photographs by NMSA staff, copyright KwaZulu-Natal Museum.

Type locality. Namibia: Hardap: Aandster Farm (25°21'34"S, 016°06'04"E, -25.35944, 16.10111).

Material examined. Namibia – Hardap • 1♂ Maltahöhe, Aandster Farm; 25°21'34"S, 016°06'04"E; 1000 m a.s.l.; 16 Feb. 1974; Irwin, M. leg.; vegetated dune and grassland; NMSA-DIP-009021, ***Holotype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from the type locality in the central Namib Desert in Namibia (Fig. 52). A rarely collected species known only from a single specimen from one collecting event in 1974 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in February in summer (Table 3). Nothing is known of the biology.

Anypodetus nigrifacies Ricardo, 1925

Figs 42–45, 52

Taxon depository. ZooBank: https://zoobank.org/AB815003-5E96-4C41-9481-8CB39BF56AE4;

GBIF: https://www.gbif.org/species/1664909;

Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F048-9D42-FF7D-F9E6D9B84607.

Diagnosis. The species is distinguished from congeners by the uniformly brown stained wings with the wings being densely covered by microtrichia, and by the overall brown coloration.

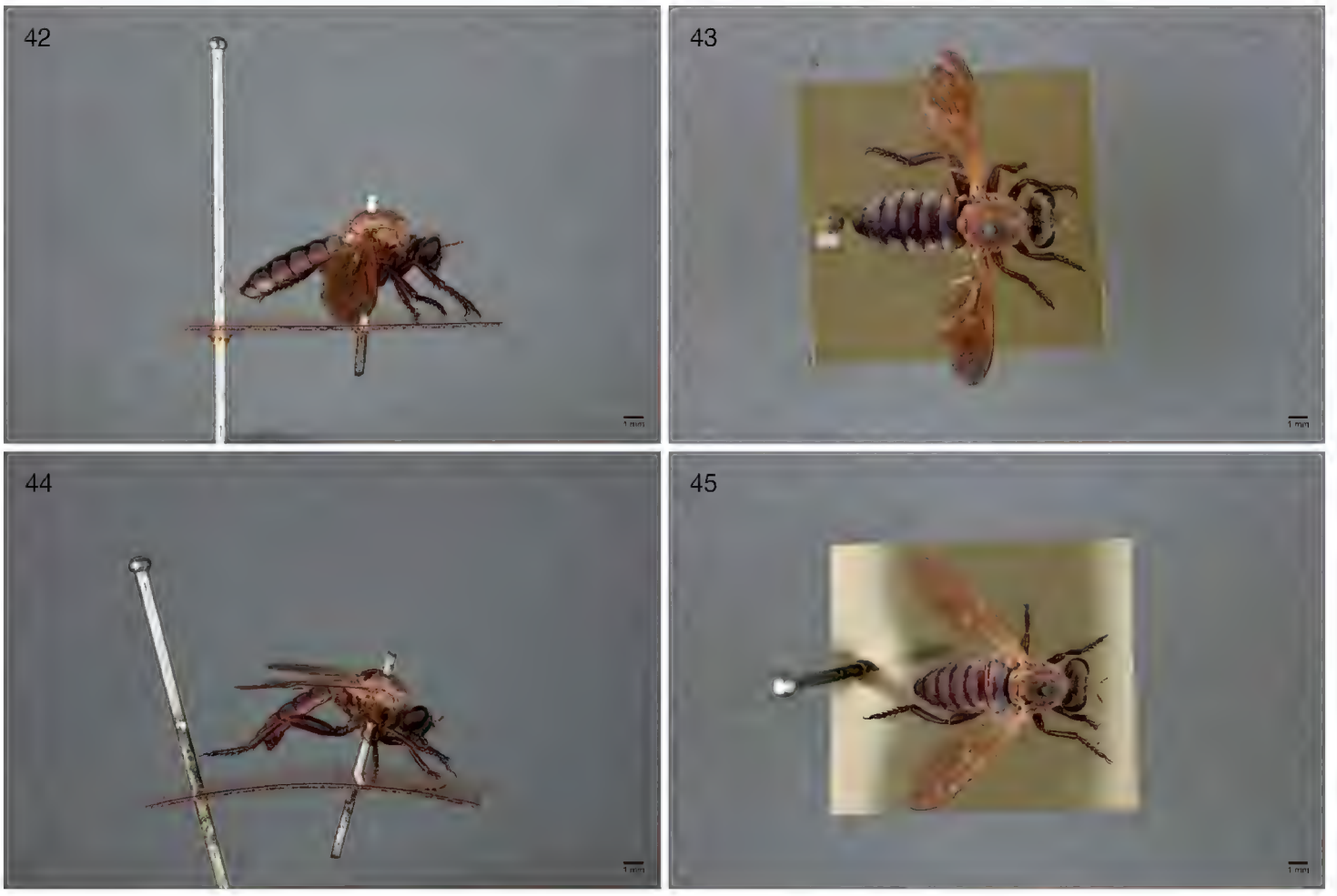
Type locality. Mozambique: Maputo: Lourenço-Marqués (= Maputo) (25°57'00"S, 032°34'00"E, -25.95, 32.56667).

Material examined. Mozambique – Gaza • 1♂ Chigubo; 22°49'55"S, 033°31'10"E; 11 Feb. 1964; Moore, A. leg.; USNMENT01140569, USNM.

Mozambique – Maputo • 1♀ Lourenço-Marqués (= Maputo); 25°57'00"S, 032°34'00"E; 12 Dec. 1906; McMillan, J.D. leg.; NHMUK013445837, Paralectotype, NHMUK • 1♀ same locality 15 Dec. 1906; McMillan, J.D. leg.; NHMUK013445835, Paralectotype, NHMUK • 1♂ same locality 18 Dec. 1906; McMillan, J.D. leg.; NHMUK013445836, ***Lectotype***, NHMUK • 1♀ Maputo; 25°58'00"S, 032°34'00"E; 15 Mar. 1980; Feijen, H. leg.; NMSA-DIP-009024, NMSA • 1♂ Moamba; 25°36'14"S, 032°14'35"E; 09–12 Mar. 1964; Moore, A. leg.; USNMENT01831272, USNM.

South Africa – KwaZulu-Natal • 1♀ Mkuzi Game Reserve; 27°38'20"S, 032°09'30"E; Jan. 1949; Munro, H. leg.;, SANC • 1♀ Mkuzi Game Reserve; 27°35'44"S, 032°13'09"E; 100 m a.s.l.; 01 Feb. 1988; Londt, Jason leg.; main camp + caravan park area; NAMS-DIP-009015, NMSA • 1♀ same data; NMSA-DIP-097038, NMSA • 1♀ same data; NMSA-DIP-097039, NMSA • 1♂ same data; NMSA-DIP-097040, NMSA • 1♂ same data; NMSA-DIP-097041, NMSA • 1♂ same data; NMSA-DIP-097042, NMSA • 1♂ same data; NMSA-DIP-097043, NMSA • 1♂ same data; NMSA-DIP-097044, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 28 Nov. 1961; Oatley, T. leg.; NMSA-DIP-009013, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 26 Oct. 1972; Irwin, M.E. leg.; NMSA-DIP-009008, NMSA • 1♀ same data; NMSA-DIP-097046, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 15 Feb. 1978; Brothers, D., Bampton leg.; Malaise trap; NAMS-DIP-009009, NMSA • 1♀ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 15 Feb. 1978; Brothers, D., Bampton leg.; Malaise trap; NAMS-DIP-097045, NMSA • 1♂ Ndumu Game Reserve, rest camp; 26°52'00"S, 032°15'00"E; 95 m a.s.l.; 23–29 Nov. 1977; Brothers, D., Guillarmond, J. leg.; Malaise trap; NAMS-DIP-009005, NMSA • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 01–10 Dec. 1963; Stuckenberg, Brian, Stuckenberg, P. leg.; NMSA-DIP-009006, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from eastern-most South Africa and southern Mozambique (Fig. 52). A rarely observed and collected species known from 22 specimens from 11 collecting events between 1906–1988 (Table 2). The species occurs in but is not endemic to the Maputaland-Pondoland-Albany biodiversity hotspot (a single collecting event is outside of the hotspot). Adult flies are active from late spring to late summer (October–March) (Table 3). Nothing is known of the biology.



Figures 42–45. *A. nigrifacies* **42** ♀ paralectotype (NHMUK013445835), lateral **43** same, dorsal **44** ♂ lectotype (NHMUK013445836), lateral **45** same, dorsal. Photographs by NHMUK staff, copyright Natural History Museum London.

Remarks. Ricardo (1925: 244) described this species on 'Types (male and female) and another male and female, all from Lorenzo Marques, Portuguese E. Africa (F.D. McMillan), in Brit. Mus Coll.' In doing so she did not designate a holotype so all her listed specimens must be considered syntypes. The three NHMUK specimens of *A. nigrifacies* were labeled as Syntypes by J. Chainey in 1984. It is unknown where the 4th specimen is deposited. Londt (2000: 134) designated 'the male as lectotype and the female as paralectotype' but none of the specimens are labeled as such and there are more than two specimens. We hereby designate the male from Lorenzo Marques (= Maputo) as Lectotype (NHMUK013445836) in order to stabilize the species concept and the two female specimens from the same locality as Paralectotypes (NHMUK013445835 and NHMUK013445837).

Anypodetus phalaros Londt, 2000

Figs 46–48, 52

Taxon depository. ZooBank: https://zoobank.org/C3B681A5-8D4C-4B27-8F74-6948971007E7;

GBIF: https://www.gbif.org/species/1664907;

Figures 46–48. *A. phalaros* **46** ♂ holotype (NMSA-DIP-073587), lateral **47** same, dorsal **48** same, head anterior. Photographs by NMSA staff, copyright KwaZulu-Natal Museum.

Plazi TreatmentBank: https://treatment.plazi.org/id/03B39D2F-F047-9D42-FF58-FDC4D9C946C7;

iNaturalist: https://www.inaturalist.org/taxa/650537-Anypodetus-phalaros.

Diagnosis. The species is distinguished from congeners by the unique mystax with regular brown setae medially and white, dorso-ventrally flattened setae laterally in both males and females.

Type locality. South Africa: Limpopo: Louis Trichardt, 37 km N, Limpopo Valley (22°35'31"S, 029°54'24"E, -22.59194, 29.90667).

Material examined. Namibia – Karas • 1♀ Brucharos (= Brukkaros); 25°52'00"S, 017°48'00"E; 06 Mar. 1972; Brown, H., Koster, E., Wessels, D. leg.; ***Paratype***, SANC.

South Africa – Limpopo • 1♂ Louis Trichardt, 37 km N, Limpopo Valley; 22°35'31"S, 029°54'24"E; Jan. 1975; Stuckenberg, Brian leg.; arid bushveld; NAMS-DIP-073587, ***Holotype***, NMSA • 1♀ same data; NMSA-DIP-009034, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from north-eastern South Africa, southern Botswana, and south-central Namibia (Fig. 52). A rarely observed and collected species known from three specimens from three collecting events between 1972–1975 and a single observation at iNaturalist in 2015 (Table 2). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in summer (January and March) (Table 3).

The iNaturalist observation (https://www.inaturalist.org/observations/11107350) indicates that this species perches on the ground. Other than that, nothing is known of the biology.

Anypodetus unicolor Oldroyd, 1974

Figs 49–51

Taxon depository. ZooBank: https://zoobank.org/B5684B4D-55C5-4C70-B695-A8A7BB5FE767;

GBIF: https://www.gbif.org/species/1664908;

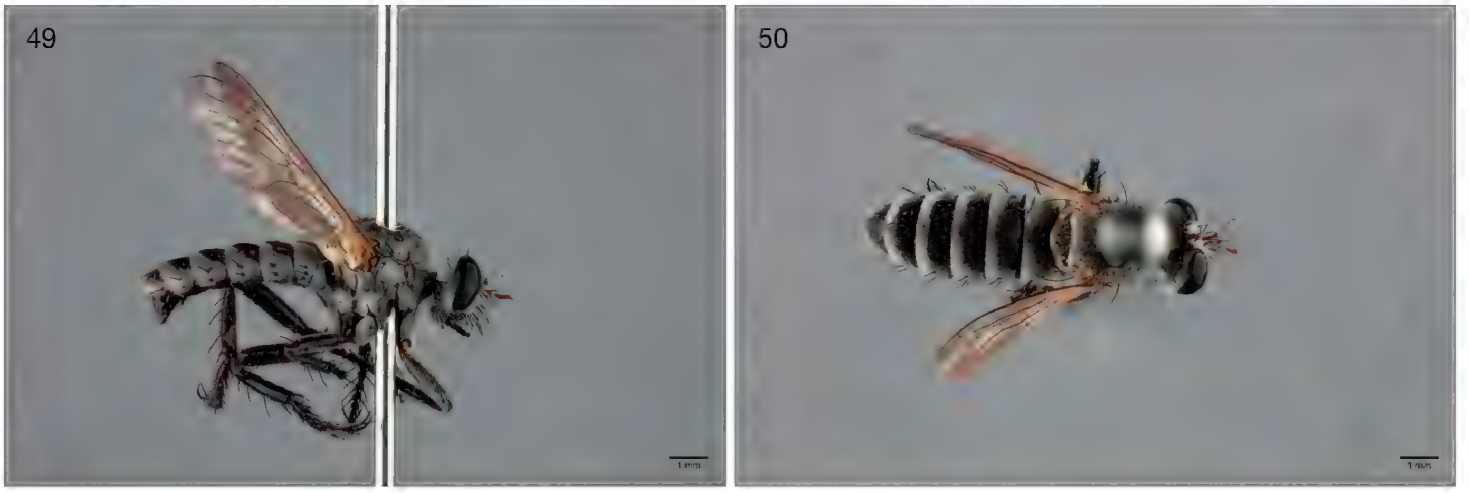
Plazi TreatmentBank (Londt 2000): https://treatment.plazi.org/id/03B39D2F-F045-9D43-FF58-FE06DB8B434D.

Diagnosis. The species is distinguished from congeners by the presence of apical scutellar macrosetae, the entirely gray pubescent scutellum, and two black medial macrosetae laterally on abdominal tergites 2–5.

Type locality. South Africa: KwaZulu-Natal: Ndumu Game Reserve camp, 32 km S (27°08'00"S, 032°15'00"E, -27.13333, 32.25).

Material examined. Mozambique – Maputo • 1♂ Lourenço-Marqués (= Maputo); 25°57'00"S, 032°34'00"E; Sep. 1913; Junod, H. leg.; NHMUK013445839, ***Paratype***, NHMUK • 1♀ same data; NHMUK013445840, ***Paratype***, NHMUK.

South Africa – KwaZulu-Natal • 1♂ Kosi Bay; 26°58'00"S, 032°48'00"E; 10–11 Feb. 1990; Eardley, C. leg.; SANC • 1♀ Kosi Bay Estuary; 26°54'00"S, 032°52'00"E; 16–19 Mar. 1982; Barraclough, D. leg.; indigenous bush area; NMSA-DIP-009038, NMSA • 1♀ Kosi Bay Nature Reserve; 26°54'00"S, 032°52'00"E; 30 Oct.–02 Nov. 1982; Londt, Jason, Barraclough, D., Stuckenberg, Brian leg.; forest + open woodland areas; NMSA-DIP-097048, NMSA • 1♀ same data; NMSA-DIP-097049, NMSA • 1♀ same data; NMSA-DIP-097050, NMSA • 1♀ same data; NMSA-DIP-097052, NMSA • 1♀ same data; NMSA-DIP-097053, NMSA • 1♀ same data; NMSA-DIP-097054, NMSA • 1♂ same data; NMSA-DIP-097055, NMSA • 1♂ same data; NMSA-DIP-097056, NMSA • 1♂ same data; NMSA-DIP-097057, NMSA • 1♂ same data; NMSA-DIP-097058, NMSA • 1♂ same data; NMSA-DIP-009035, NMSA • 1♂ Makaheli Forest, 5 km NE Mangusi; 26°58'00"S, 032°45'00"E; 30–02 Nov. 1982; Barraclough, D., Londt, Jason, Stuckenberg, Brian leg.; forest; NMSA-DIP-097059, NMSA • 1♂ same data; NMSA-DIP-097060, NMSA • 1♂ same data; NMSA-DIP-097061, NMSA • 1♀ Makana, 5 km E, near Ndumu Game Reserve; 03 Dec. 1982; Londt, Jason, Barraclough, D. leg.; roadside; NMSA-DIP-024271, NMSA • 1♂ same data; NMSA-DIP-009039, NMSA • 1♂ Mseleni; 27°22'00"S, 032°31'00"E; 29 Nov. 1982; Stuckenberg, Brian, Barraclough, D., Londt, Jason leg.; woodland, sandy area; NMSA-DIP-024271, NMSA • 1♂ Ndumu Game Reserve; 26°52'00"S, 032°15'00"E; 26 Oct. 1972; Irwin, M.E. leg.; NMSA-DIP-009030, NMSA • 1♂ Ndumu Game Reserve camp, 32 km S; 27°08'00"S, 032°15'00"E; 98 m a.s.l.; 29 Nov. 1971; Irwin, M.E., Irwin, B.J. leg.; dry scrub forest;



Figures 49, 50. *A. unicolor* **49** ♂ paratype (NHMUK013445842), lateral **50** same, dorsal. Photographs by NHMUK staff, copyright Natural History Museum London.

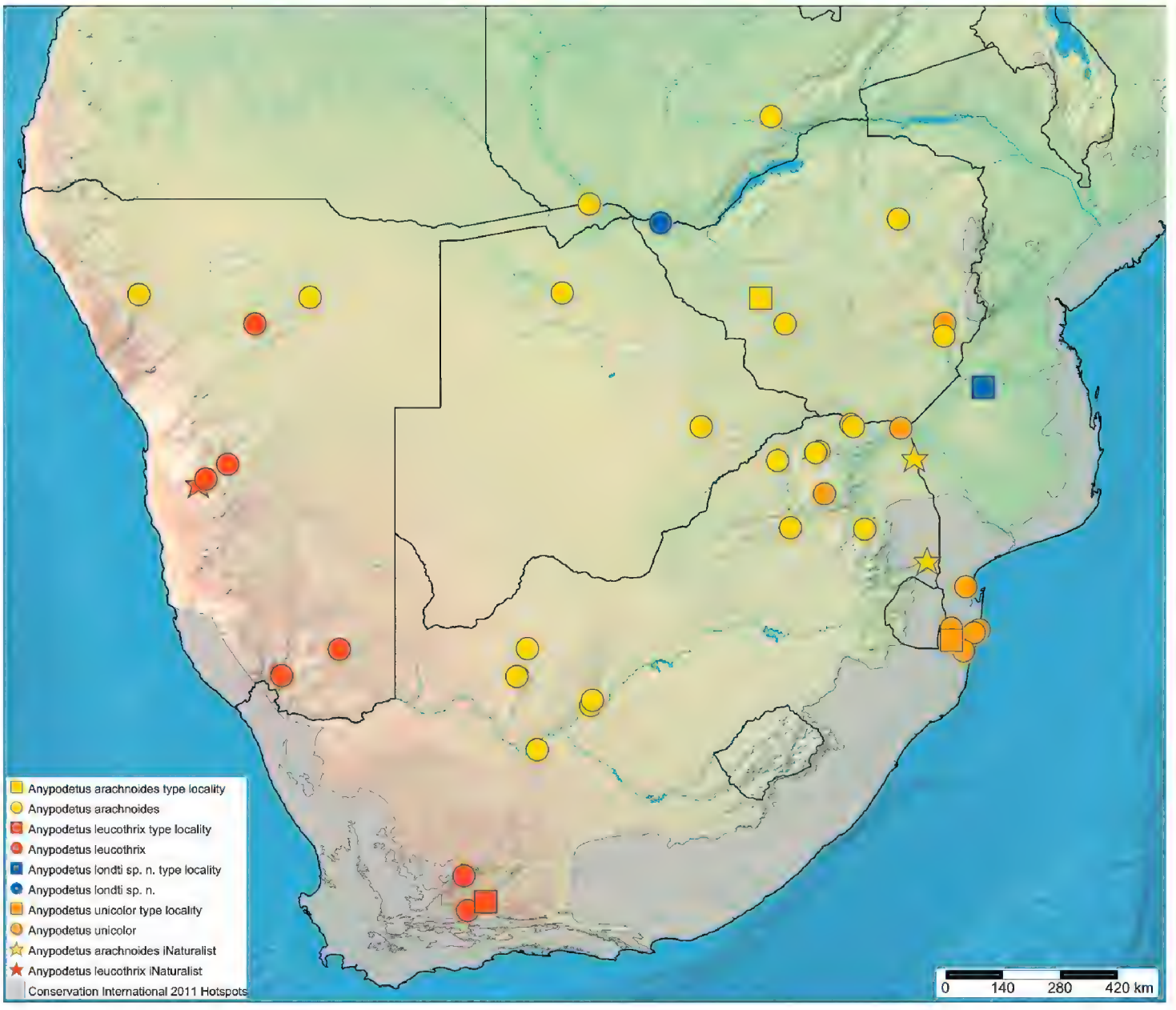


Figure 51. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *A. arachnoides*, *A. leucothrix*, *A. londti* sp. nov., and *A. unicolor* (SimpleMappr https://www.simplemappr.net/map/20266). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20266.kml.

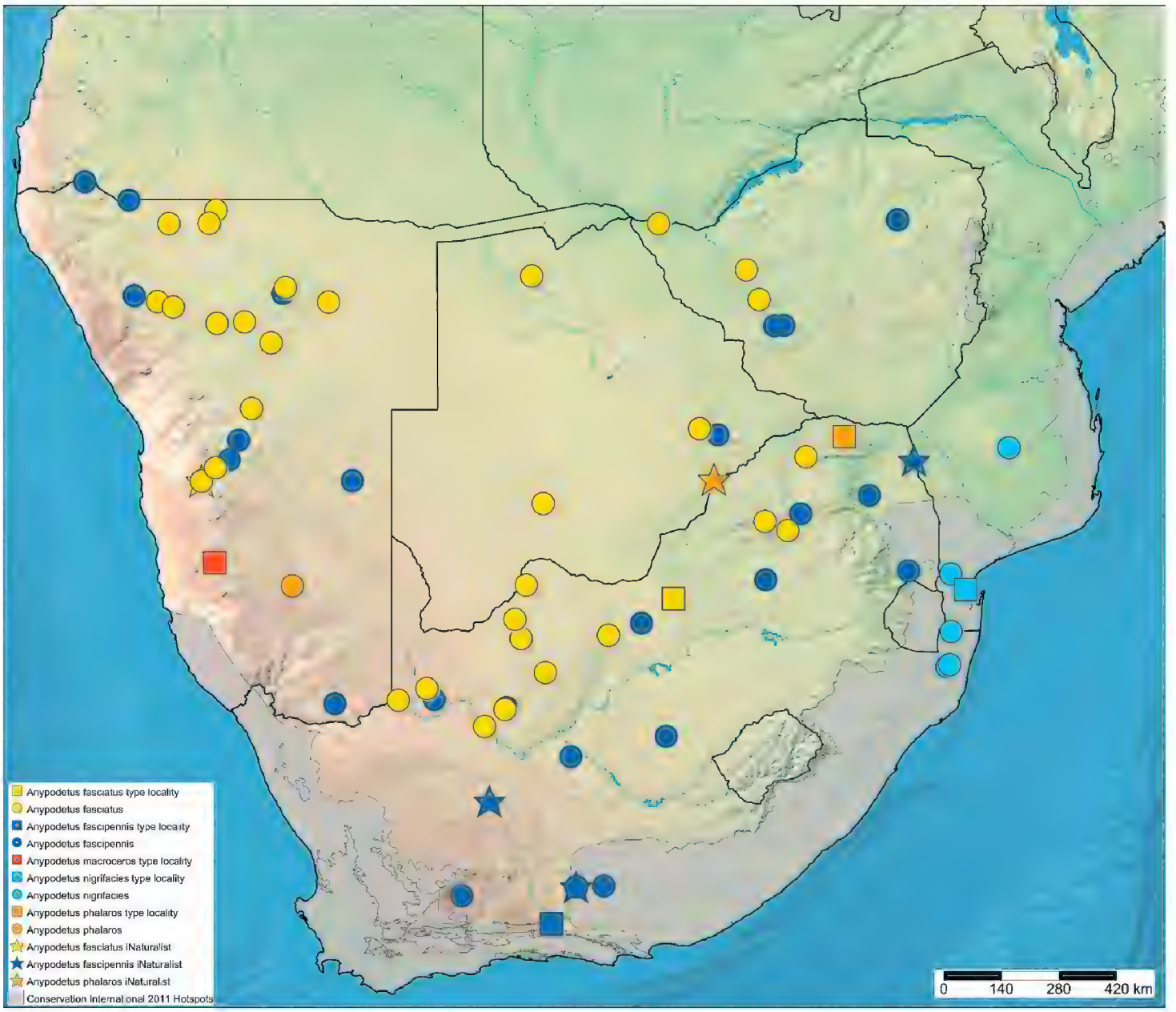


Figure 52. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in gray) and distribution of *A. fasciatus*, *A. fascipennis*, *A. macroceros*, *A. nigrifacies*, and *A. phalaros* (SimpleMappr https://www.simplemappr.net/map/20267). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/20267.kml.

NMSA-DIP-73586, ***Holotype***, NMSA • 1♀ same data; NMSA-DIP-009023, NMSA • 1♀ same data; NMSA-DIP-073586, NMSA • 1♀ same data; NMSA-DIP-097159, NMSA • 1♀ same data; NMSA-DIP-097160, NMSA • 1♀ same data; NMSA-DIP-097161, NMSA • 1♀ same data; NMSA-DIP-097162, NMSA • 1♀ same data; NMSA-DIP-097163, NMSA • 1♂ same data; NMSA-DIP-097164, NMSA • 1♂ same data; NMSA-DIP-097165, NMSA • 1♂ same data; NMSA-DIP-097166, NMSA • 1♂ same data; NMSA-DIP-097167, NMSA • 1♂ same data; NMSA-DIP-097168, NMSA • 1♂ same data; NHMUK013445842, ***Paratype***, NHMUK • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 28 Nov. 1961; Oatley, T. leg.; NMSA-DIP-009029, NMSA • 1♀ Ndumu Reserve; 26°52'00"S, 032°15'00"E; 01–10 Dec. 1963; Stuckenberg, Brian, Stuckenberg, P. leg.; NMSA-DIP-097158, NMSA

• 1♀ same data; NMSA-DIP-009018, NMSA • 1♀ same data; NMSA-DIP-097156, NMSA • 1♀ same data; NMSA-DIP-097157, NMSA.

South Africa – Limpopo • 1♀ Kruger National Park, Lanner Gorge; 22°27'00"S, 031°08'00"E; 23 Jan. 1985; Mansell, M. leg.; SANC • 1♀ Pietersburg (= Polokwane), Naawpoort; 23°54'00"S, 029°27'00"E; 27 Nov. 1927; van Son, G. leg.; NMSA-DIP-009031, NMSA.

Zimbabwe – Masvingo • 1♀ Devuli Ranch; 20°08'00"S, 032°06'12"E; 13 Feb. 1971; NMSA-DIP-009017, ***Paratype***, NMSA.

Distribution, biodiversity hotspots, seasonal imago flight activity, and biology. Known only from eastern South Africa, southern Mozambique, and south-eastern Zimbabwe (Fig. 51). A moderately commonly observed and collected species known from 44 specimens from 15 collecting events between 1913–1990 (Table 2). The species occurs in but is not endemic to the Maputaland-Pondoland-Albany biodiversity hotspot. Adult flies are active from spring to late summer (September–March) (Table 3). Londt (2000) reports one prey record: Diptera: Chironomidae.

Remarks. *A. unicolor* was originally described from eastern-most South Africa, adjacent Mozambique, Zimbabwe, another South African locality (Nauwport interpreted to be 'Pietersburg (= Polokwane), Naawpoort' by Londt (2000)) in north-eastern South Africa, and Namibia. The paratypes from Namibia, deposited in the NHMUK, were studied through photographs and it became clear that they are not representing the same taxon as the holotype from Ndumu Game Reserve, KwaZulu-Natal, South Africa, but belong to the widespread species *A. fasciatus* and are listed under that species. Therefore, this species is restricted to eastern South Africa, southern Mozambique, and south-eastern Zimbabwe.

Key to species of *Anypodetus*

An online, illustrated version of the below dichotomous key is available at https://keys.lucidcentral.org/keys/v4/anypodetus_dichotomous. The male terminalia illustrations included in Londt (2000) can be helpful as well but the identification below does not rely on those structures as other features can be utilized to distinguish all species.

1 set of 2 black medial macrosetae laterally on abdominal T2–5 (Fig. 49) ..... ***A. unicolor***

– only 1 yellow or black medial macroseta laterally on abdominal T2–5 (Fig. 36) **2**

2 scutellum apubescent; long apical scutellar macrosetae present; pleura and scutum predominantly apubescent (Fig. 34) ..... ***A. leucothrix***

– scutellum entirely pubescent; apical scutellar macrosetae absent (setae at distal scutellum tip at most as long as discal scutellar setae); pleura and scutum entirely pubescent (Figs 18) **3**

3 frons with 3–4 short, yellow (sometimes light brown) proclinate macrosetae laterally (Figs 26–27); wings in anterior ½ brown stained with white transverse bands (Figs 25, 29) ..... ***A. fascipennis***

– frons with only 1 (sometimes 2) long, black or yellow proclinate macroseta laterally (Figs 20–21); wings not patterned (either brown throughout or +/- unstained, Figs 19, 47) **4**

4 mystax (in males and females) medially with regular brown to black macrosetae, laterally with white, tightly packed, dorso-ventrally flattened setae (Fig. 48) ..... ***A. phalaros***

– mystax (in males and females) without distinct vertical setal coloration pattern (e.g., Figs 14–15, 20–21, 38) **5**

5 mystax (in females and males) with only regular, circular setae (Figs 20–21) 7

– mystax in males with white, tightly packed, dorso-ventrally flattened setae at least in dorsal ½ of face (Fig. 15), in females with circular setae only and restricted to ventral ½ of face (Fig. 14, female of *A. londti* sp. nov. unknown) **6**

6 mystax in males with very long white, tightly packed, dorso-ventrally flattened macrosetae on entire face, reaching tip of circular long black ventral mystacal macrosetae (Figs 36, 38)..... ***A. londti* sp. nov.**

– mystax in males with short white, tightly packed, dorso-ventrally flattened macrosetae in dorsal ½ of face, circular black mystacal macrosetae in ventral ½ of face much longer than white ones (Figs 15, 17) ..... ***A. arachnoides***

7 wings uniformly brown stained (additionally, covered with dense microtrichia) (Figs 43, 45); restricted to southern Mozambique and adjacent eastern-most South Africa (Fig. 52) ..... ***A. nigrifacies***

– wings unstained (Figs 19, 39, microtrichia absent or present); restricted to western parts of southern Africa (Figs 51, 52, western Zimbabwe and northern South Africa westward) **8**

8 postpedicel apically narrowing (appearing as an elongate stylus, Figs 39, 40) .... ***A. macroceros***

– postpedicel regular, +/- cylindrical throughout (Figs 12, 16) ..... ***A. fasciatus***

Discussion

Wing venation intraspecific variation

Londt (2000) used the alignment of veins M_2 and M_3 in the first couplet in his key to species. As highlighted under *A. leucothrix*, the alignment of these veins can be variable within a species and may cause misidentifications. Furthermore, it is somewhat difficult to state whether the veins are fully aligned or not – it is clear when they are such as in the *A. arachnoides* specimen photographed in Fig. 13 but not as straightforward

when there is a slight alignment break as in the *A. fasciatus* specimen photographed in Fig. 23. It is also difficult to discern any particular pattern of this venation variation. It does not appear to be strictly correlated with the distribution as specimens from the same locality may show alignment differences as in the specimens of *A. leucothrix* collected at the same locality in late September 2017 and 2019 (Figs 31, 35, red arrow). The very distinct non-alignment of M_2 and M_3 in *A. fascipennis* is unmistakable (Fig. 29) and unique to this species. The newly developed identification key above does not rely on wing venation to avoid any problems in determining *Anypodetus* specimens.

Mystax development and sexual dimorphism

In Asilidae, the sexes are usually only distinguishable morphologically by examining the tip of the abdomen to locate the female ovipositor or male terminalia. *Anypodetus* is unique in that respect as the development of the facial setation, the mystax, differs between the sexes in several species. To help identify species and to associate females and males, Table 1 provides short, comparative descriptions of the mystax development in females and males. Of the nine *Anypodetus* species, seven are known from both sexes (*A. londti* sp. nov. and *A. macroceros* are only known from males). Of these, the mystax between females and males differs in four species, *i.e.*, *A. arachnoides*, *A. fasciatus*, *A. fascipennis*, and *A. leucothrix*. *Anypodetus arachnoides* females are unique in that the mystax is restricted to the ventral ⅓ of the face (Fig. 14) whereas in all other species, the mystax occupies the entire face. *Anypodetus leucothrix* males are unique in that the face is entirely apubescent (Fig. 33) whereas it is gray, yellowish, or light brown pubescent in all other species. Also more unusual among Asilidae is that the mystax of *Anypodetus* is often composed of different macrosetae such as 'regular' circular setae and dorso-ventrally flattened setae, *i.e.*, in *A. arachnoides* males (Fig. 15), *A. londti* sp. nov. males (Fig. 38), and *A. phalaros* females and males (Fig. 48).

Distribution

Species of *Anypodetus* occur throughout southern Africa but so far the genus has not been recorded from Eswatini or Lesotho (Fig. 11). A notable exception in terms of its distribution is its absence in much of the coastal habitats along the Atlantic and Indian oceans with the exception of eastern-most South Africa and southern-most Mozambique (Fig. 11). Furthermore, *Anypodetus* has not been collected or observed in the otherwise species-rich Succulent Karoo and Cape Floristic Region biodiversity hotspots (Fig. 11). It is likely that the genus also occurs in at least southern Angola and is more widespread in southern Zambia and Mozambique.

Three species, *A. arachnoides*, *A. fasciatus*, and *A. fascipennis*, are more commonly collected (Table 2) and widespread across southern Africa (Figs 51, 52). *A. leucothrix* (Fig. 51) and *A. phalaros* (Fig. 52) are somewhat widespread as well, but with many fewer collecting events to date (Table 2). Interestingly, several species have been collected at the same locality, and sometimes even sympatrically. For example, *A. fasciatus*

and *A. leucothrix* have been collected sympatrically in the Namib-Naukluft NP in Namibia (C14 locality, 23°34'25"S, 015°48'39"E) by the senior author in November 2018 (habitat photos in Figs 7, 8). However, these species may compartmentalize the microhabitats of this eastern-most extent of the Namib Dune Sea as the microhabitat and perching data on the label suggest: *A. fasciatus* perching on sand at base of sparsely vegetated sand dune; *A. leucothrix* perching on sand on sparsely vegetated sand dune. Other localities with more than one species recorded are:

(1) Bulawayo, Zimbabwe with *A. arachnoides* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1923-11-04.

(2) Hillside, Zimbabwe with *A. arachnoides* and *A. fascipennis*.

(3) Maputo, Mozambique with *A. nigrifacies* and *A. phalaros*.

(4) Ndumu Game Reserve, South Africa with *A. nigrifacies* and *A. phalaros* with 2 collecting events with both species sympatrically on 1972-10-26 and on 1963-12-01–10.

(5) Outjo, Namibia with *A. fasciatus* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1925-01.

(6) Sawmills, Zimbabwe with *A. arachnoides*, *A. fasciatus*, and *A. fascipennis*.

(7) Serowe, Botswana with *A. fasciatus* and *A. fascipennis*.

(8) Victoria Falls, Zimbabwe with *A. fasciatus* and *A. londti* sp. nov.

(9) Vryburg, South Africa with *A. fasciatus* and *A. fascipennis* with 1 collecting event with both species sympatrically on 1939-10.

Seasonal imago flight activity

Species of *Anypodetus* have been collected in the Southern Hemisphere spring to late summer – September–March with the Zambian record of *A. arachnoides* (NHMUK013445830) recorded in August (Table 3). The majority of species have an imago flight activity from October–March. *Anypodetus londti* sp. nov. (December, February), *A. macroceros* (February), and *A. phalaros* (January, March) with fewer records available appear to be more restricted. *Anypodetus leucothrix* appears to fly earlier in the season with activity already in September in the Namib Desert.

Biodiversity hotspots

Of the nine species of *Anypodetus*, only three occur within a currently recognized biodiversity hotspot *sensu* Conservation International namely Maputaland-Pondoland-Albany. While *A. fascipennis* occurs in the western-most extent of the hotspot (Fig. 52), *A. nigrifacies* and *A. unicolor* occur in the eastern-most section straddling South Africa and Mozambique (Figs 51, 52). *A. fascipennis* and *A. unicolor* are also widespread outside of this hotspot whereas there is only a single collecting event known for *A. nigrifacies* outside of the hotspot. It is of note that *Anypodetus* species do not occur, based on our current knowledge, within the Cape Floristic Region and Succulent Karoo biodiversity hotspots that are otherwise diverse for Asilidae species (Dikow et al. 2009).

Conclusion

Anypodetus is a unique genus of Afrotropical Asilidae restricted to southern Africa. The now nine recognized species are widely distributed in this region and the number of iNaturalist observations might be an indication that species can easily be observed in natural environments. Namibia holds the largest species diversity with six species recorded.

In the field, the genus can be confounded with species of *Trichardis* Hermann, 1906 (reviewed by Londt (2008), see iNaturalist observations https://www.inaturalist.org/observations/63361137 and https://www.inaturalist.org/observations/11087325) but all species of *Trichardis* have well-developed pulvilli.

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